The
MINING
CONGRESS
JOURNAL
December
1935
The Mining Congress Journal Wishes You
A Happy and Prosperous New Year

OUR nation is large, too large for any individual to cope with all of the problems of mining. The American Mining Congress renders many specific services that are beyond the reach of most mining men. Let us explain more in detail any of the following:

Government Contacts
Coal Mine Modernization
Taxation
Laws Affecting Mineral Resources
Weekly and Special Bulletins
Western (Metal Mining) Division
Expositions—Coal and Metal
Standardization
The Mining Congress Journal

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THE AMERICAN MINING CONGRESS

Munsey Building

Washington, D. C.

Blasting NEWS

PREPARED BY
HERCULES POWDER COMPANY
INCORPORATED
WILMINGTON, DELAWARE

Headframe and ore bin of the Roadside mine.

GOLD MINING RECOVERY SEEN

Present-day revival in gold mining has resulted in the reopening of many small gold mines in the West. Mining districts, dormant for years, are coming back to life with gold ore shipments that presage even more extensive developments.

In keeping with this interest, a timely article on gold mining and milling methods was recently made available to readers of *The Explosives Engineer*. Descriptive of methods practiced in the Katherine District, Arizona, the article by Leon M. Banks, has attracted attention because conditions at Katherine resemble those in many other mining districts, and therefore much of the procedure can be adopted by other small gold mining properties.

Included in Mr. Banks' article is a summary of drilling and blasting methods in the various mines, together with a discussion of the history and geology of the district.

Gold mine operators who have not yet read the article may obtain copies by requesting "Gold Mines at Katherine," published in the May, 1935, issue of *The Explosives Engineer*.

HERCULES SHUNTS ARE DESCRIBED

The purpose of shunts on electric blasting caps is fully described in a folder entitled "Hercules Shunts" just printed by Hercules Powder Company.

Hercules manufactures two shunts—the "Wassen" type and the "Eyelet" type. Both are designed to minimize the probability of a premature explosion of an electric blasting cap which might be caused by electric current accidentally coming in contact with bare ends of leg wires.

The leaflet is illustrated with diagrams showing how the shunts are removed. Copies will be forwarded on request.

HERCULES
PLANNED BLASTING
makes available:

1. Explosives exactly suited to your work.
2. Organized methods enabling you to use them to best advantage.

WRITE FOR DETAILS

"Mine Foremanship" Demand Continues

Nearly 30,000 copies of the booklet *"Mine Foremanship,"* by Dr. J. J. Rutledge, have been distributed since its publication, according to officials of Hercules Powder Company. Many important companies are using it as a text in their extension courses to men who are studying for promotion.

Although written primarily for mining men, hundreds of copies have been requested by individuals and companies in wholly unrelated industries.

The booklet is a compilation of the first seventeen lectures in the monthly study course conducted in *The Explosives Engineer* by Dr. J. J. Rutledge, chief mine engineer, Maryland Bureau of Mines. This series is still a popular feature of *The Explosives Engineer*.

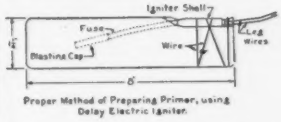
Demand for *"Mine Foremanship"* is based on its commonsense and simple style. Copies will be sent on request to individuals or firms.

MISFIRES TRACED TO FAULTY PRIMERS

Misfires were practically eliminated in a large coal mine when the management instructed miners in correct methods of making primers, according to an article recently published in *The Explosives Engineer*.

This was but one phase of an individual instruction program in the use of explosives, which resulted in a great reduction in explosives accidents with corresponding benefit to employes and employers.

Instruction was highly personalized, contact with miners being made in working places underground. Some of the subjects considered included: placement of holes; care of blasting machines, detonators, and powder; installation of firing lines; preparation of primers; charging of drill holes; misfires; accidents, their causes and prevention.



Proper Method of Preparing Primer, using Delay Electric Igniter.

That this instruction was responsible for a great reduction in fatal and non-fatal accidents is clearly shown in the charts illustrating the article.

Reprints will be forwarded on request.

Blasting In Metal Mines

Probably no metal-mining study of drilling and blasting practice is more complete than *Drilling and Blasting in Some American Metal Mines*, a book of 197 pages published by Hercules Powder Company.

This book, presenting a study of methods in 90 leading mines, represents the results of the work of the country's foremost mining engineers.

Drilling and Blasting in Some American Metal Mines is so arranged, illustrated, and tabulated that it can be used as an easy guide to help in the solution of blasting problems for properties of various sizes and characteristics.

The increasing importance of metal mining makes the book of unusual importance at this time. *Drilling and Blasting in Some American Metal Mines* is available free of charge, to men in positions to utilize it.

BLASTERS' SCALE FOUND USEFUL

Many quarry and open-pit operators who like to "figure" the yardage of contemplated shots have found the Hercules Blasters' Scale of considerable help. The scale also gives suggested spacing of well-drill holes under various conditions.

The handy device which slips in a coat pocket, consists of a card which slides through a slotted envelope-container. Table 1 gives the number of cubic yards of material in the solid displaced per foot of hole at spacings ranging from 8 ft. to 26 ft. From Table 2 can be obtained the yardage for the entire length of the hole.

Besides these tabulations, the Blasters' Scale contains other important information of value to quarry operators. The scale is available, free of charge.

Convenient Coupon

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☐ Hercules Shunts; ☐ Planned Blasting; ☐ Gold Mining;
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The MINING CONGRESS JOURNAL

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WHICH CONTROLLER
For Your Synchronous Motor?

G-E synchronous-motor controllers, such as those shown here, will provide 100-per-cent protection for your synchronous motors under all operating conditions. Contributing to this protection are two exclusive features which make these controllers outstanding in their field—each is provided with a squirrel-cage protective relay and a power-factor field-removal relay.

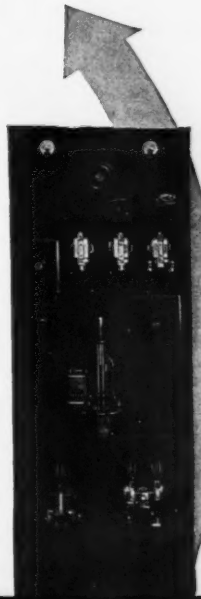
What Does This Mean to You?

It means that the shutdowns and repair expense caused by burned-out squirrel-cage windings are eliminated by the protective relay. And it means that line disturbances caused by motors pulling "out of step" are minimized by the action of the power-factor field-removal relay.

Synchronous-motor controllers are only one example of General Electric's ability to supply reliable and efficient electric equipment for every application. An installation of the right G-E motors, control, and wire and cable is a money-saving combination. Write or call the nearest G-E sales office, or General Electric, Dept. 6J-201, Schenectady, N. Y.

Full-voltage Magnetic Controller

This device is the most commonly used and the least expensive of the complete line. It is particularly suitable for low-speed synchronous motors, but it can be used wherever the power system will not be unduly disturbed by the full-voltage inrush current of the motor. With it, you can automatically control the motor by a push-button station, pressure switch, float switch, or similar pilot-control device



Full-voltage Semi-magnetic Controller

Where remote control is not required and where operating conditions are such that an operator is in attendance, the full-voltage semimagnetic controller can be used to advantage. It will minimize line disturbances by automatically applying field after the proper motor speed has been reached. It offers the same sturdy construction and reliable operation provided by G-E magnetic-type controllers.

Reduced-voltage Magnetic Controller

The reduced-voltage magnetic controller is designed for use on systems where full-voltage starting is not permitted, or where reduced starting torque is required by the application. Like the full-voltage magnetic controller, it is operated by a push-button or pilot-control device. It employs an autotransformer, a starting contactor, and a running contactor. The controller first automatically applies reduced voltage and then, after a definite time delay, applies full voltage to the motor

Reduced-voltage Semi-magnetic Controller

The reduced-voltage semimagnetic controller is especially suitable for general-purpose service where the power system requires reduced voltage. It can also be used to advantage for starting loads where it is desirable to apply reduced torque to minimize shocks and possible damage to driven machines. Starting of the motor is accomplished by pushing the handle forward. Transfer to full voltage is made by moving the handle to the "run" position

THE RIGHT MOTOR FOR EVERY JOB—THE RIGHT CONTROL FOR EVERY MOTOR

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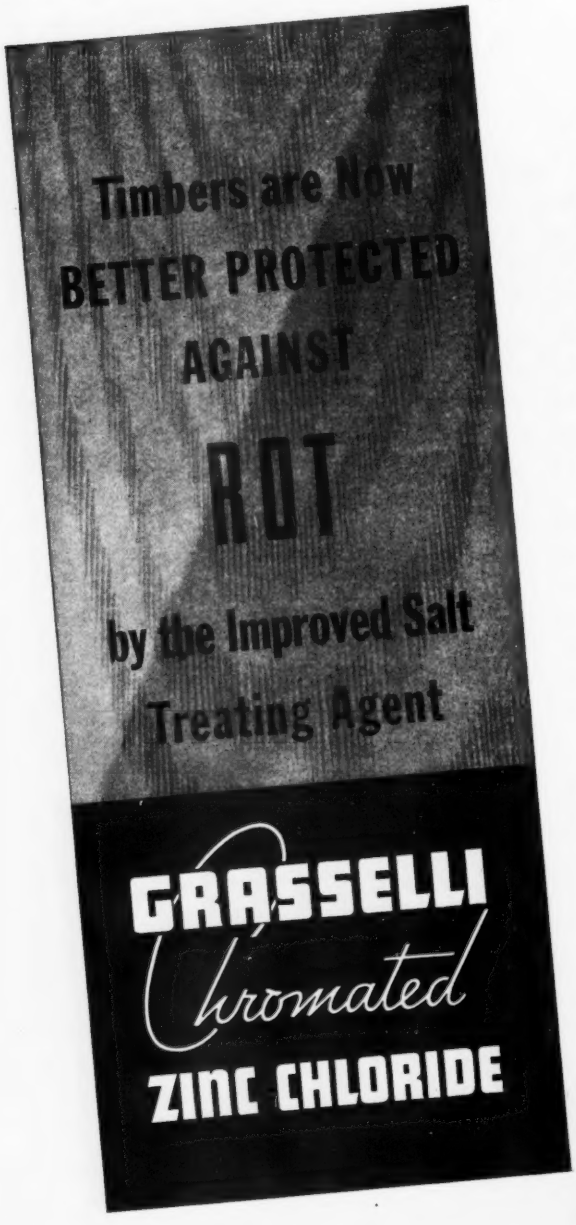
GENERAL ELECTRIC

A DEFINITE ADVANCEMENT IN WOOD PRESERVATION



● For many years, mine and mill executives have been familiar with the superior preservative properties of zinc chloride, the standard salt treating agent for rendering wood ROT-PROOF. Its long established records have been definitely attested in varied commercial use.

Announcement has just been made of an improved zinc chloride—*Grasselli Chromated Zinc Chloride*. Its major constituent is Zinc Chloride, augmented with Sodium Bi-Chromate. This commodity, definitely, has increased preservative value.

Our new booklet tells all about it. Space permits only summarizing its many advantages here:

1. **It is a better preservative against decay.**
2. **It is a low cost commodity.**
3. **It acts as a repellent to termites.**
4. **It gives clean treatment.**
5. **It is odorless.**
6. **It permits satisfactory painting.**
7. **It is free of poisonous compounds, such as arsenic or volatile toxic organic materials.**
8. **It imparts measurable fire retardance.**
9. **The corrosion of hardware affixed to treated wood is practically no more than is the case with untreated wood under the same conditions of exposure.**
10. **It requires only conventional equipment for its use.**

Commercial treating plants are located conveniently near you to treat timbers under pressure . . . Write us for their names.

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Why Shall We Change?

LESS than 200 years ago these United States constituted a vast wilderness. This great area was apparently of much less importance to the world than Portugal, or Belgium, or a dozen other of the small countries of the world.

Our forefathers, beat back the wilderness and made for themselves and families a living out of the products of the soil from small areas, which first had to be divested of primeval forests before cultivation was possible. Each pilgrim, dependent upon the production from his own small acreage, developed principles of individual independence and responsibility. This does not mean that there was no sympathy between neighbors, or that there was no aid given to those in distress, but it does mean that each individual felt responsible for the success of his own enterprise and that he looked to his neighbors for help only in times of unusual adversity. Each family depended upon the success of the head of that family. Few people were permitted to starve in those days but the improvident and the lazy were forced to take subsistence only from charitable sources. Residence at the county poor farm carried with it a stigma of reproach and was regarded then as a proper disgrace to those who failed to perform their part of the neighborhood service which made for individual prosperity.

Those were the principles upon which this great nation of ours was founded.

During the short space of 100 years, from an inconsequential position, these United States became the greatest nation in the world. Industrial prosperity had its ups and downs. Panics and industrial depressions were endured and overcome. In each case, we progressed from industrial depression to unusual prosperity, to inflation of our money medium; to abuse of our credit system; and to final collapse.

It is the history of all prior depressions that the downward trend of prices was not interfered with by artificial means and that when the slump had reached the point below which it could not go, real money came from its hiding places because it was certain that prices could go no lower and therefore investments would not result in loss.

Each investment led to other investments. The climb from deep depression to normal conditions was rapidly made, always stimulated by the law of supply and demand, and the natural instinct of all men to make a profit.

Falling prices always meant hoarding of capital; rising prices always meant the investment of capital. Every such investment resulted in the employment of labor.

Capital, by itself, is helpless and can only be made profitable in conjunction with labor, and whether money is loaned by the original holder to some man who will invest it in industrial enterprise, or whether the investment is made directly, money has no earning power except in conjunction with labor. And so it is that in all previous business collapses in this country, a few years brought us back upon a road leading to high business prosperity and sometimes to an excess of business prosperity which in turn led to inflation and a later collapse.

Each depression was followed by a higher level of business. To say that all of these principles were wrong and that every policy leading to these marvelous successes should be cast aside, is to entirely ignore the teaching of history.

Our history is filled with brilliant examples of business success.

To substitute for the policies upon which such progress was based, the silly and impractical notions of inexperience seems to be extremely foolish. Policies based upon sympathy for the down-and-outs; for those who are unwilling to play the game according to the rules; who are lazy and shiftless; who are educated to believe that the world owes them a living whether they earn it or not—these are the bases of the New Deal.

A recent compilation by the automobile industry shows that of the 34,927,121 autos in the world, 24,751,644 are in the United States. No Socialistic argument can possiby prove that a country builded upon individual incentive and individual independence, starting at zero 150 years ago and now able to own two-thirds of the automobiles of the whole world, should change that principle if it expects to continue its industrial growth.

This industrial growth has developed the greatest of national luxuries, the highest wages, the best living conditions for the laboring men of any nation in the world.

BETHLEHEM STEEL PRODUCTS
that help to lower mining costs

SUPERIOR HOLLOW DRILL STEEL SPEEDS STOPING AND DRIFTING

THE freedom from breakage, the edge- and gage-holding qualities of Bethlehem Superior Hollow Drill Steel have won wide and constantly increasing acceptance for it throughout the mining industry.

Bethlehem Superior Hollow Drill Steel is rolled from inherently tough, resilient steel of exceptional fatigue- and wear-resistance, combined with the hardness to hold sharp cutting edges. A smooth bore, free from pits and other irregularities, prevents fatigue from getting a foothold, reduces breakage to a negligible item.

ABRASIVE-RESISTING PLATES REDUCE WEAR FROM ORE HANDLING

PLATES in chutes, hoppers, skips, dump cars and similar service about the mine and mill are subject to heavy abrasive wear.

Bethlehem Abrasive-Resisting Steel Plates sharply reduce the cost of keeping this equipment in repair. Though possessing the requisite hardness and toughness to greatly lengthen life under abrasive conditions, these plates cost but slightly more than ordinary steel. They are sufficiently ductile to permit simple forming operations.

88-80 REDUCES MAINTENANCE ON GRINDING MACHINERY

BETHLEHEM 88-80 is an alloy steel developed just for the purpose of carrying the brunt of the grinding and pulverizing involved in concentrating ores. 88-80 Castings have wear-resistance that is not only high but uniform—all the way across the face, all the way through. They never wear into pockets. Their edges never break or spall off because of over-hardness.

STEEL TIES MAKE DEPENDABLE TRACK

BETHLEHEM Steel Ties are easy to handle and to attach. They automatically grip the rails at the correct gage and hold them there, eliminating gaging. They make strong track, permitting faster and more efficient haulage, with less danger of derailment. No chance for rails to spread or roll over.

Bethlehem Steel Ties are made for every mine requirement. They range from the No. 2 Tie, weighing 2½ lbs. per ft., to the Keystone No. 6 Tie, weighing 6 lbs. per ft. When needed, still heavier Bethlehem Ties are available.

BETH-CU-LOY SHEETS FOR SERVICE IN DAMP LOCATIONS

IN locations exposed to the weather or to extremely damp conditions underground, the rust-resisting properties of Beth-Cu-Loy make for long life.

Beth-Cu-Loy Sheets are made of copper-bearing steel. Atmospheric-exposure tests carried out by the American Society for Testing Materials showed this material to have from two to two and one-half times the resistance to atmospheric corrosion of steel without the copper content.

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DECEMBER
1935

A Journal for the entire mining industry published by The American Mining Congress

The 74th Congress

IT IS but a few weeks until Congress is back with us. The second session of the 74th Congress convenes early in January, and it is a mere matter of speculation as to when it will complete its tasks. Since the last session and the adoption of a "breathing spell" for business, industry has improved. There is a distinctly upward swing in both industry and morale. Let us hope that the incoming session will do nothing to upset the trend, and that rather it will do much to push us ahead. It can accomplish the latter by transacting all business with the utmost dispatch and adjourning.

The decisions of the Supreme Court on New Deal projects will undoubtedly have considerable effect upon the type of legislation presented. If the processing tax is held unconstitutional Congress may feel it is necessary to find new ways and means of securing revenue. There also is the threat of additional huge appropriations to meet relief and other needs that may call for a reopening of the entire tax question. International issues involving neutrality, war profits and foreign trade, and the bonus promise to be live subjects.

In spite of these possibilities, Congressional leaders probably have their "ear to the ground" and are fully aware of the undercurrent of dissatisfaction, the growing opposition to any increase in taxes, further interference with business, and any new legislation at this time. The general feeling apparently is that the shorter the Congressional Session, the sooner real prosperity will arrive.

Budgets

PRESIDENT ROOSEVELT and his Aides have been giving serious consideration to the budget for 1936, with every indication that both the President and Chairman Buchanan of the House Appropriations Committee will freely use the blue pencil. There is much talk about balancing the budget, and an equal amount concerning the necessity for increased appropriations for relief projects. The battle is about even between those who want to cut down Government expense and those who have pet projects that require Government financing. Mr. Buchanan will have considerable difficulty evading these projects, for, in spite of all the indications of a rise in employment, the most reliable agencies report that the unemployed still remain at the interesting figure of 10 millions. Relief and job making are among the most serious problems of the Administration. The budget depends upon how these problems are solved. The Government has pledged its aid until—and when—industry is capable of accepting the burden. And industry frankly admits that it cannot accept the burden until Congress shall discontinue its efforts at bureaucratic control and Government competition with private enterprise.

Those who stick their heads in the sand and believe that Government and industry are separate entities believe that Government can indefinitely accept the responsibility for job creation, and that industry is willfully laying down on the job. Those who face facts know that every nickel the Government spends comes from industry, and that the continual process of spending borrowed money can lead only to disaster.

Therefore, it is to be sincerely hoped that the President and Mr. Buchanan will find ways and means of reducing the budget, and that industry, freed from the shackles of bureaucracy, will be given opportunity to create jobs.

Chaotic Taxation

EACH year brings increasing tax burdens, and each year finds those responsible for raising the tax faced with greater difficulty in finding new avenues of revenue. State, Federal and local governments are competing ever more strenuously for the tax dollar. It is, then, of more than passing interest that President Roosevelt recently told the Conference of Mayors that he expects to call a conference sometime in 1936 to study revision of our chaotic system of taxation. The major purpose of such a conference would be to define the rights of each group and establish lines of demarcation between different types of taxes, and in deciding how they should be allocated.

Because of the increasing protests of industry, the Government, through the Treasury Department, has been carrying on extensive studies in taxation, and it should now be in a position to outline tax reform measures that will produce sufficient revenue and eliminate some of the present competition and duplication.

Mining states will welcome such a conference and endorse such an effort. They have long contested the present system that has cost them so heavily. Each year has brought increased burdens of taxation, until the breaking point has been reached. Action by the President in calling such a conference is desirable, and every cooperation should be given to make the recommendations of the conference beneficial.

The Ultimate Answer

THE ultimate answer to the coal problem is not the Guffey bill or any governmental regulatory agency. Artificial price fixing to stem the tide of cost competition with oil and gas is only a makeshift, a temporary expedient.

In other industries similar problems have been solved by machine production. Why is this not in part, at least, the answer to coal? There are examples in the industry that indicate that progressive operators believe that this is the ultimate remedy. Thousands of dollars are now being spent to modernize production methods. As production is mechanized, as mass-production principles are applied to the industry, cost will automatically be reduced to the point where there is equitable adjustment with all competitive fuels.

The long range view is not a national policeman to enforce disciplinary measures. Rather it involves constructive, conservative, intelligent plans of lowering cost through machine production methods and improved operating technique.

With Due Modesty

A LEADING economist recently pointed out that the United States is a "self-contained nation;" that although this country has but little more than 6 percent of the world's population it can almost build, clothe and feed the world. He further points out that we produce 43 percent of the world's coal, 54 percent of iron, 64 percent of steel, 49 percent of copper, 64 percent of petroleum, 51 percent of lumber, 69 percent of cotton, and build 84 percent of the world's motor vehicles.

And while we are establishing records, the mineral industries modestly present the fact that they pay 22 percent of the Federal taxes; furnish, directly or indirectly through the extraction and processing of mineral products, a livelihood for some 25 million people; furnish 55.9 percent of the tonnage of revenue freight handled by Class 1 Railroads; spend approximately 350-millions annually for equipment and supplies to produce the minerals; pay a uniformly high wage rate, furnishing an annual payroll of more than one and a half billion dollars.

Any legislation designed for or against these industries, which involve such a large number of taxpayers, should have most careful consideration.

Planning Boards

THE National Resources Committee recently announced that Planning Boards have now been organized in 46 states, to coordinate Federal and state public works projects. These boards have made a survey of the financial condition of communities and their building programs for the next 10 years, and from this survey has been suggested an array of public works projects that is most interesting.

In considering the work of these Planning Boards, it is well not to confuse them with the ordinary interpretation of the phrase "Economic Planning." The type of planning recommended by the National Resources Committee has no relation to the Russian idea of Planned Economy. In essence it would seek to provide continuing expert knowledge for the guidance of all types of Government units, which would be offered in an advisory capacity only.

Already 137,000 projects, to cost 20 billions of dollars, have been unearthed. And Secretary Ickes, in commenting upon the work, said, "If public works are to be timed to aid in counteracting industrial fluctuations, one of the essentials is a long range program, constantly kept up to date. . . . I am convinced that long after the necessity of stimulating industry and creating new buying power has been removed national planning will continue as a permanent government policy."

According to conservative estimates, some 26 billions are to be spent on public works during the next 10 years. The taxpayer, who must bear the ultimate cost of this expenditure, has a right to know that his money is being spent to the best advantage. The voluntary Planning Boards may or may not be an important safeguard to insure intelligent handling of this phase of the New Deal's program.

No End of Bureaus

THE many agencies in our Government that deal with the mineral industries give rise to the feeling that we are suffering from a severe attack of "bureau-itis." The fact is that there are more than 60 departments, bureaus, commissions, boards and committees located in the National Capital charged with some measure of responsibility of importance to mining. Here are some of them: Federal Trade Commission, Bituminous Coal Commission, Tariff Commission, War Minerals Division of the War Department, the Census—to say nothing of our more familiar Bureau of Mines, Geological Survey, and Congress, itself, plus its investigating committees. Many of these are both useful and helpful, yet the total is somewhat appalling to those who contact them.

At the moment there is a growing resentment at the number of bureaus in our Federal system. It has been termed the most gigantic business ever established. Half a million people are on the national payroll, with a hundred and ten thousand of them located in Washington. It is stated that it will require more employes to administer the Social Security Act than are now required by the Postal Service. Public opinion seems to be crystallizing—and it isn't in favor of any more bureaus. There seems to be no limit to the zeal of the reformer, whose first and last suggestion is a committee to study the situation. Steadily the Government has absorbed the states' prerogatives in the matters of control, regulation and taxation in industry. It is high time that this rising tide be stemmed, and that we simplify industry's methods of dealing with its Government.

The International Tax Problem*

By HENRY B. FERNALD†

THE international tax problem has two different, but related, aspects which I want to present to you. The first aspect is that of a problem of taxation common to practically all nations regardless of location, form of government or existing tax systems. The second aspect is the more specific problem of the double taxation of incomes of taxpayers engaged in international trade.

The common tax problem as it exists today in its most difficult phase is due to one common condition.

In practically all countries there has been the urge that the scope, the activities and the costs of government should increase. This urge comes in part from politicians who want political power and preference, who feel they need the patronage and who revel in the feeling of great accomplishments and the issues which may thus be raised. The urge also comes from many well-meaning, quite unselfish citizens who advocate one after another worthy purpose, usually with little or no consideration of its cost or where the money to pay for it is to be obtained. A political speech on a worthy purpose is apt to get more votes than come from a discussion of budget economies or wise administration. So in this country and throughout the world the scope, the activities and the costs of government have been increasing much faster than the increase in wealth and income of the people. When business was active and wealth and incomes were rapidly increasing, governments could increase their activities and their expenditures without additional taxes, because taxes at the same rates yielded continually increasing revenues. But governments went further than this. Bonds were easily authorized and sold to cover expenditures even beyond the amounts of bounteous revenues. New and increased taxes could be imposed without being seriously felt in a time of abundant prosperity.

So firm was the belief in the wisdom and need of continually increasing government activities and expenditures that to many the thought of merely a pause in continuing increase was not to be entertained. A decrease in business activity and in wealth and income seemed to them to call simply for more rapid increase in government expenditures. Governments could and did pass laws to impose new and additional taxes and to mortgage the future by government borrowings.

There were some laws that were beyond the power of governments to alter, and one was the law of diminishing returns. Increased taxes do not stimulate business activity, nor the wealth and incomes that flow from it. The funds that go into government bonds are not at the same time available for business finance and development. Nor does the vision of the future tax load necessary to carry and pay for such bonds beget the confidence essential for increased business activities. There readily comes the point when the law of diminishing returns takes effect and the increased tax burden does not yield increased revenues.

Let me here illustrate this relation of possible future taxation to business confidence and activity.

Under the income tax the Government asserts its right to participate in the income from business enterprises, but without liability, or only limited liability to share in losses. The Government reserves its right to dictate, with change from time to time as it wishes, what shall be its percentage share of the income. It also reserves the right to make its own rules for computing the amount of income in which it is to share. There is to be no adherence to fixed rules either as to percentage of interest or as to how that percentage is to be computed. The rules in effect at the beginning of a period may not be those when profit-sharing time arrives.

A partnership relation such as this is not one which would be generally very appealing. No man would be much inclined to enter such a partnership arrangement unless he had the utmost confidence in the honesty, the sense of fairness, and the reasonableness of attitude on the part of the dominant partner. Certainly a man would not be attracted to such a relation if he knew the dominant partner was regularly living far beyond his income, with no hope of meeting his increasing indebtedness except by increased withdrawals at the expense of his partners. He would be particularly disinclined to do business on those terms with one whose past record showed that he was in the habit of changing the rules as he wished to the detriment of his business partners; or if he was openly threatening largely to take from them their shares of the business profits.

Men who find themselves already in that business relationship may be forced to continue but are not apt to be very enthusiastic and whole-hearted about it. Men are not, however, greatly inclined to undertake new activities and incur new business risks on this basis.

Of course, this does not beget business confidence. It does not stimulate business activities. It is not the sole deterrent factor to business progress, but manifestly it is an important factor in discouragement of business enterprises.

But even if we could bar out the disturbing question of uncertainty, we would still have left the plain mathematical proposition that whatever amounts are taken by taxation from business profits will reduce to that extent the incentive for business enterprise. This is not important if the rate of tax is low. Our 1 percent normal and maximum 7 percent surtax rates of 1913 were so low that they could be disregarded. Probably a 10 percent rate can be applied without notable economic effect, but tax rates of 50 percent or 75 percent are factors that cannot be lightly brushed aside. If you or I were offered opportunity to go into a partnership where we were to supply the capital, we were to supply the ability, energy and work, and we were to stand any losses, but the other partner was to receive 50 percent of any income simply because he gave us the opportunity to engage in the enterprise, we would not even consider it unless the profits were extraordinary. If we considered that a proposition must yield 10 percent return in order to merit our effort and the risk, we would not consider entering into such a 50 percent partnership agreement unless we could see reasonable hope of returns of 20 percent a year; or if a 6 percent return seemed reasonable, we must expect a 12 percent yield. Of course, those extraordinary opportunities are not common, so rarely would there be any inducement to enter such a 50 percent profit-sharing agreement.

I am not here arguing whether or not we should try to drive from business activities those whose proven business abilities have already given to them substantial incomes. I am not trying to argue whether or not we should discourage

* Presented to Metal Mining Convention, The American Mining Congress, September, 1935.

† Loomis, Suffern & Fernald.

men of established wealth from making business investments. I am simply pointing out that high tax rates and uncertainty as to future taxation have the inevitable effect of discouraging business activities and decreasing business incomes and consequently, from the standpoint of government revenues, may readily pass the point of diminishing returns. I am not trying to say just where that point may be. It certainly exists quite effectively at a 50 percent rate and to a very substantial degree it exists at much lower rates.

It has its direct effect as particular individuals turn from business investments to tax-exempt bonds or as they merely decline to take advantage of business opportunities which to them hold out no inducements equal to the risk and effort involved. It has its indirect effect as it means a lower scale of business activity of employment and of profits to others. If we want this, we know excessive taxation is one of the means to bring it about. If we do not want this, we know at least this one contributing cause we might eliminate. I am not trying to argue which result is more desirable. Each man can decide for himself which result he would rather have.

Throughout the world there is this common tax problem which comes from the demand for continually increasing government expenditures with the political thought that the necessary revenues must be raised without any appreciable burden on the majority of people but with the unrepealable economic law that troubles are ahead unless this can be done without burdening or discouraging business enterprise. We may expand our government activities and expenditures without additional tax burdens provided we keep such increase parallel to the increase of wealth and income of the people, but that formula means contraction rather than expansion of government expenditures in time of depression. We may to some extent increase our government expenditures and dilute the tax burden by placing it on the entire people in such a way that it will not discourage the energy and initiative of those who might go ahead with business development. But, of course, this invites a popular demand for government economies, as we have seen in my own state of New Jersey as the response of the people to the recently imposed sales tax.

What I have been saying does not voice any new discoveries or theories. It has all been recognized by economists and experienced tax administrators for 100 years and more. Each generation of tax spenders or would-be spenders hope to find a new answer, but each time they are driven back to the fact that there is a point beyond which business taxes cannot rise without being such a burden on business as to defeat their very purposes.

Now let us turn more specifically to the matter of the double taxation of international enterprises. When most countries had low income tax rates or none at all, the income tax was no obstruction to international business activities. In the wartime, tremendous income and profits taxes were imposed, at first without any provision for offsetting the tax paid to one country against the tax to another, and it was a fact that the profits on international business transactions might actually be taxed more than 100 percent of their amount. Goods manufactured in the United States, sold through London for delivery in France, might have three claimants for taxation on the entire profits realized, each refusing to recognize any claim of the other. The situation was so grievous that our own Government included in the Revenue Act of 1918, on the recommendation of Commissioner (now Secretary) Roper, a provision to allow foreign taxes paid on income or profits to be taken within certain limitations as credits against the amount of United States income tax payable thereon. This first provision was rather crude and has been subject to later revisions and amendments, but nevertheless every subsequent Revenue Act has continued to recognize this principle.

It needs no argument that with each country imposing on business incomes the full amount of tax which it believes business can stand without discouraging enterprise (and we must assume that today practically every country will do this), if any two countries each impose such a tax on the same income it will make a load which must discourage business activity, with resulting detriment to each of the countries concerned.

Two means of avoiding this are generally proposed. One would have each country tax only such income as might be considered to have arisen from sources within that country, leaving to other countries the right to sole taxation of such incomes as had arisen within their respective jurisdictions. This proposal is urged on the ground that the home country is so much benefited by having the incomes created abroad brought back to this country for expenditure here, with the resulting subsequent tax inuring to it, that it can well afford to forego any income tax in the first instance. The other proposal is along the lines which our country has adopted, considering all income of our citizens or residents as subject to our tax but offsetting such tax by a credit for the amount of tax which they might have to pay to other countries on profits arising outside of the United States.

However, even though we have one or the other of these methods to avoid such double taxation, we have not solved the question unless we have agreement between the countries concerned as to what shall be considered the income allocable to each country. This does not involve the entire question of how taxable income in each country may be computed. One country may allow greater or less deductions from income for depreciation, or other items. One may determine that income is taxable when it accrues, whereas another may consider it taxable only when realized. The doctrine of constructive receipt in one country may differ from the doctrine in another. One country may be limited by constitutional provisions which do not exist in another. These differences, however, do not necessarily mean that there need be double taxation as between such countries.

Double taxation arises when two countries are each trying to tax the same income. For example, in the case of mineral production—if one country requires that income realized within that country shall be determined as representing the difference between the cost of production

House and Senate in Joint Session.

and the market value of the mineral products as produced in that country, whereas another country determines that income is realized from the sale of the product within its boundaries as represented by cost of production less selling price, we have a clear example of double taxation. The taxpayer may not be so much interested in the particular rule which may be applied, as he is to have some rule adopted between the countries to avoid the double taxation of the same income.

A number of years ago Dr. Thomas S. Adams, with others interested in it, brought this matter up for international consideration. The International Chamber of Commerce and its committees have long been urging and working for the elimination of such double taxation as one of the barriers to international trade. The question was brought before the League of Nations which has had its fiscal committee, consisting principally of experienced tax administrators of various countries, studying the problem in its various phases. In 1933, after an extended series of studies under the direction of Mitchell B. Carroll, the fiscal committee of the League agreed upon a draft convention with respect to allocation of business incomes, and this draft was submitted to various governments, including our own, for their consideration. In June of this year the fiscal committee reviewed the replies it had received from various governments and made certain minor modifications in the original draft.

The essential principle of this draft convention is stated in Article III as follows:

"If an enterprise with its fiscal domicile in one contracting state has permanent establishments in other contracting states, there shall be attributed to each permanent establishment the net business income which it might be expected to derive if it were an independent enterprise engaged in the same or similar activities under the same or similar conditions. Such net income will, in principle, be determined on the basis of the separate accounts pertaining to such establishment. Subject to the provisions of this convention, such income shall be taxed in accordance with the legislation and international agreements of the state in which such establishment is situated."

Further provisions of the draft convention are to the effect that: if the accounts are not on the basis which would prevail between independent persons dealing at arm's length, the authorities shall have power to make necessary adjustments; if no accounts are produced or if the accounting produced does not correspond to normal usages of the trade, the fiscal authorities will have power to make empirical determinations based on percentages determined from the results obtained by similar enterprises operating in the country. Certain special provisions are included regarding banking and financial enterprise but recognizing the general principles laid down in Article III. Maritime shipping and air navigation enterprises would be taxed only in the country in which the real center of management is situated. The separate identity of a subsidiary company is to be recognized.

Leaching Plant, Andes Copper Mining Company, Chile.

The draft is confined to dealing with the allocation of "business income" but not including interest, dividends, rentals and royalties, etc. The matter of double taxation as to interest, dividends, rents and royalties is undoubtedly if great importance and needs to be settled, but there was so much difference of opinion as to how such items should be taxed that it seemed wiser to confine this draft to allocation of general business income along lines as to which there could be general agreement than it would be to have all these questions deferred until complete agreement could be reached. Naturally the so-called "creditor nations" feel that interest, dividends, rents and royalties should be taxable by the country of citizenship or residence of those who receive them. The so-called "debtor nations" are no less insistent that they should be taxed as income to the recipient in the country from which they are paid. The result is that today almost every country, like our own, is taking both positions simultaneously and treats such items as income taxable by it when they are received by its citizens or residents from foreign sources and also treats them as income taxable by it when paid from sources within its jurisdiction to foreign citizens or residents. Of course, this is an inconsistent position and an outstanding example of double taxation. It ought to be remedied by general agreement among the nations. We have to some extent at least done this by our recent Treaty with France. I wish it were possible to get some present unanimity of agreement regarding it and I hope such agreement may come.

However, the fact that it was not possible at the present time to reach agreement on these and some other subjects seems no reason for failing to agree on those subjects of general allocation which are covered by the present draft convention. Personally, I should like to have seen the draft go much further and be much more specific as to basis and methods of allocation, but I think that all of us who have followed the discussions of these points through the International Chamber of Commerce and in the sessions of the fiscal committee of the League were forced to recognize that it was much better to have the draft convention cover the general principles applicable and only include such details as could receive general acceptance than it was to get into interminable discussions and indefinite delay regarding a lot of subordinate details.

The general principles of this draft convention represent the agreement of a substantial group of experienced tax administrators as represented in the fiscal committee of the League of Nations. They also have the approval of business concerns as represented by the committee on double taxation of the International Chamber of Commerce. Another point as to which the convention does not go as far as some of us would like to see it go is that it does not attempt to have one nation agree with others as to how it shall tax its own citizens. Each country is left free under the draft, if it desires, to impose a double taxation on its citizens or on concerns which have their fiscal domicile in its jurisdiction. It is felt that some countries at least would not be willing to give up any rights of taxation of their own people even though they might be quite willing to agree with another country as to taxation of citizens or residents of that country. Some

feel that the draft does not go nearly as far as it should in this particular, whereas others feel that the convention as drafted is such a great advance in recognition of essential principles of taxation that its general adoption by the different countries should not be delayed by any disputes as to further items. Personally I should like to see the draft promptly adopted by our own country and others because I believe it will be a very substantial forward step which, if taken, will avoid many questions of double taxation which now exist. Then, with such a step taken, I believe we can proceed more readily in an effort to get agreement on other matters.

Let me make clear that this draft convention is not intended as an agreement or rule that the League should attempt to impose upon its members. All the League has done is to offer its facilities to help in arriving at such a draft of a convention which there seemed a possibility the various nations, not as members of the League but in their own sovereign capacities, might wish to adopt in order to have a common ground for settlement of a mutual problem.

In speaking thus of the draft convention, I would not ignore the fact of the large number of treaties which have been entered into between various countries for the elimination of double taxation. There is our own Treaty with France. There are quite a number which exist between various European countries. The difficulty with these purely bilateral treaties which are the result of negotiations between any two particular countries is that they do not solve the general question of allocation of business incomes. One pair of countries may agree along certain lines and another pair along different lines. The result is that we may have as many different methods as there are treaties. Perhaps this is not so serious when we are dealing with individual items such as interest, dividends, rents and royalties where we have the single question presented as to what shall be considered the point of incidence of the tax. Uniform agreement is, however, exceedingly important when we are dealing with questions of income allocations because it is not a simple situation if a concern doing business in several different countries is called on to make allocations of its income as between those countries according to several different sets of rules as concerns each of them. Of course, bilateral treaties are better than none, but I think all of us who have been following the situation hope that we may have plurilateral treaties in the interest of general uniformity. We do not hope that all the nations of the world will forthwith become signatories to a general convention of this kind. We do seem to have considerable reason to hope that such convention might be adopted by a number of the nations. If three, four or five of the important nations of the world should enter into such an agreement, it would then make a standard which we could hope would receive much wider acceptance. There are a number of nations, including our own, who have already expressed themselves as approving in principle such a convention as this. So we seem to have good reason to hope for real progress along this line.

Now let me revert to some of what I have said earlier regarding recognition that income taxation can be a factor substantially deterrent to business enterprise. The cardinal thought of this draft convention and of all treaties to eliminate double taxation is that it is really in the interest of the various governments to do this. The group of tax administrators represented in the fiscal committee of the League of Nations have not made their recommendations for the purpose of giving a special favor to business enterprises at the expense of their respective countries. They have done it because they have recognized that excessive taxation (and double taxation is generally excessive taxation) is a deterrent to business enterprise which will result in decreased incomes and decreased tax revenues to their countries. Any sacrifice of present revenues will be made up through the increased revenues to be derived from the adoption of a sound and reasonable tax policy. Governments do not get their revenues from virtually barring business activity through excessive taxation, nor do they make jobs and give employment, comfort and wealth to their people by tax policies which discourage and impede business.

Calestones Smelter of the Braden Copper Company, in Chile.

Before I close, I might mention very briefly a few technical points in our own Government's dealing with questions of the foreign tax credit.

(A) Article 131-8 of Regulations 86 presents a new formula for computing the limitation on credit for foreign taxes under section 131 (f). Someone in the Bureau discovered an abstruse reading which might be given to this section to justify this more complicated formula to give somewhat less credit than was allowable under former regulations. The fact that the old formula had been repeated in successive regulations for many years, and that the law had been repeatedly reenacted without change while those regulations were in effect is given no weight as against the chance to get a few additional dollars from the taxpayer. Furthermore, the new regulation is to be considered as retroactively applicable to past years.

(B) A recent decision (I. T. 2909—I. R. B. XIV-32) holds that the duty imposed on "annual profits of mining companies" by the Quebec Mining Act is not an income tax and may not be claimed as a credit against United States income tax under section 131 of the Revenue Act of 1934. The argument seems to be that, since this Canadian tax is based on ore "sold, utilized, or shipped" it is not an income tax under our constitutional definition, and so may not be claimed as a credit against our U. S. income taxes. Perhaps we may now expect the Bureau to search each foreign income tax law and procedure to find where each, at some point, departs from our constitutional standard. Perhaps it may hope thus to avoid the right to foreign tax credit which our law for years has given. It is hard to believe such a standard is correct when we know that our Government has collected and retained many millions of dollars of income taxes under provisions of our laws or regulations which our courts have declared unconstitutional, and that it still continues to report them as being collections of income taxes.

(C) The Treasury Department has been pressing an attempt to collect taxes from non-resident aliens on profits from sales of securities by or for them on our stock exchanges. It gets little cooperation from the English and others who do

(*Concluded on page* 39)

The Fallacy of Higher Wages, Shorter Hours and Increased Taxation *as the Basis of Prosperity**

By SILAS H. STRAWN†

THE most difficult problem confronting us is that of unemployment. Both employers and employes would welcome an economic status in which there would be short hours of work and high wages. The difficulty lies in the inability to adjust that condition to the production of commodities at a price which will find a market.

No one has yet evolved a plan whereby we can have shorter hours and higher wages for the worker, higher prices for the producer, reasonable profit for the distributor and prices for the products which the consumer is able to pay.

Proponents of the shorter work week (30 hours, for example) make the following contentions:

1. That it would, to a large extent, relieve the existing burden of unemployment and materially reduce the cost of relief for the unemployed;

2. That industry must be compelled to give employment to the unemployed by shortening hours of work of its present employes;

3. That the reduction in the number of hours must be accompanied by a corresponding increase in wages in order to maintain the purchasing power of the workers now employed;

4. That, through the mechanization of industry, labor has become so increasingly productive that a large proportion of the unemployed cannot be absorbed in industry unless the weekly hours be shortened.

Thus it is asserted that not only would millions of workers be reemployed but purchasing power would be greatly increased and this additional buying power would revive business and bring about prosperity.

I shall endeavor by reference to studies which have been made by such competent authorities as the Chamber of Commerce of the United States, the National Association of Manufacturers, the National Industrial Conference Board and others, to point out the fallacy of such proposals and the economic impossibility of realizing them.

No one wishes to bring about a lowering of the standard of living for our working population but, on the contrary, it would make for greater happiness and prosperity were the standard raised.

Yet the conclusion is inescapable, that if workers were prohibited by law from working more than 30 hours per week, as is now proposed by the American Federation of Labor, the standard of living of the working people would rapidly decline. This conclusion is reached from a careful analysis by competent experts of the effects of a 30-hour week, unemployment, the costs of production, prices of the product, purchasing power and output per worker. While we may admit there would be some increase in the number of workers employed, it would be slight compared with the number now unemployed.

I submit the following facts are incontrovertible:

1. The costs of production would be increased because it would necessarily follow that the additional costs of labor would be pyramided at each successive stage of the process of production and distribution until the commodity reached the ultimate consumer at a price which he would be unable to pay. Increased costs of operation can be met only by increasing prices or decreasing profits. The great majority of industries which are operating at all are now making small, if any, profits, and therefore the increased cost of production cannot be absorbed by the producer. It necessarily must be passed on to the consumer. Consumer resistance to higher prices reduces the demand for goods.

It requires no argument to demonstrate to experienced employers that if a 30-hour week were adopted one of two results is inevitable. Assuming that the present scale of wages, on the basis of a 40-hour week would be reduced to the basis of 30 hours, that would mean that 25 percent of the pay of employes in existing industries would be transferred to those now unemployed. This is not the proposal. On the contrary, it is proposed that if the 30-hour week be adopted the same wages would be paid for 30 hours as for 40 hours. This means a 33 1/3 percent increase in labor costs. There is no present indication that the consumer could absorb this additional cost. The result would be a buyers' strike, the immediate slowing down of production, a decrease in the amount of the weekly pay envelope and serious labor troubles.

2. The ability of different industries and various enterprises in the same industry to shift the cost to consumers would vary according to the percentage of labor costs to the total cost of production.

3. To produce a maximum volume of business, employment and wage standards must be suited to the requirements of each enterprise. Those standards must be flexible enough to meet the needs of individual enterprise within the industry as well as the needs of diverse industries. Inflexible statutory restrictions on employes' working time throughout all fields of business would result in lessened production, contraction in trade and lower standards of living for large numbers of employes.

4. Consequently, the 30-hour week would penalize those industries where labor costs are a large part of total costs, and create more unemployment rather than less.

5. Recent surveys show that approximately one-half of those now out of work are employed in the durable goods industries. The 30-hour week would affect most unfavorably these industries.

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† Former president of the Chamber of Commerce of the United States.

There can be no lasting recovery in our economic condition until there is a substantial revival of activity in the durable goods industries.

Less than 500,000 of the now unemployed are normally attached to consumer goods industries.

6. The 30-hour week would discriminate against those industries producing highly processed goods. It would in effect impose an additional cost upon the use of labor at every stage in the production and distribution of a commodity, from the raw material to the consumer.

7. Plants operating at a relatively high rate of capacity would be hampered by being required to reduce working hours of their present employes to employ additional help. Efficiency would be reduced, uneconomic additions to plant might be forced, and business might be driven to inefficient establishments, with a consequent loss in total volume and quality of production.

In an address last autumn, George A. Sloan, late president of the Cotton Textile Institute, stated that a reduction from a 40-hour to a 30-hour week in the manufacture of flour, for example, would probably bring about an immediate increase of 36.2 cents per barrel; that in the bituminous coal industry the 30-hour week would increase the cost of bituminous coal 30 cents a ton and that it was estimated by coal operators that a reduction in the consumption would probably throw out of work fifty to sixty thousand men; that in the manufacture of shoes the increase would be from 10 to 20 percent.

8. The farmer would not be directly affected by the 30-hour week. He cannot adopt a 30-hour week. He must work from sunrise to sunset. Nevertheless, if others adopted shorter hours, with less weekly earnings, he would suffer a reduction in the purchasing power of the buyer of the goods he has to sell. The increased prices of manufactured goods would materially decrease the ability of the farmer to buy fertilizer, machinery, farm equipment and other things that he needs.

9. In normal times about two and one-half millions of our workers are engaged in production of articles for export trade. Advances in wage rates, labor costs and selling prices in industries competing with foreign producers would be serious. Our foreign trade, already very much diminished, would experience a further shrinkage in goods produced for export. The manufacturer would also meet less demand for products competing with foreign-made goods sold in our domestic market.

10. While the 30-hour week might increase the spread of the money in circulation, it would not increase the purchasing power of the wages. There would be no increase in the demand for goods and no stimulus to business revival.

11. The shorter work week would not appreciably reduce the cost of unemployment relief. Employers usually reemploy first those workers who are most efficient or who were laid off last, because that class are kept on the pay rolls as long as the employer can use their services. The larger number of persons on Federal relief are those workers who have been unemployed for longer periods of time.

It is said that machines and technological developments have created permanent unemployment and that to provide employment for all workers the available work must be spread by limitation of hours and that purchasing power must be maintained or increased by arbitrary determination of wage rates.

The Industrial Conference Board says:

"This claim has been made at intervals ever since the industrial revolution in England, when British workmen destroyed the machinery and plants of their employers because they believed these mechanical agencies of production to be responsible for unemployment. It is unquestionably true that every rapid advance in the adaptation of power machinery to industrial processes has temporarily deranged the balance between demand and supply of labor, but, heretofore, at least, each temporary displacement of labor has ultimately been followed by an expansion of the demand for labor, because the lower costs and prices resulting from mechanized production have broadened the markets and increased the demand for manufactured products and consequently have created jobs for many more persons."

Government statistics show that the proportion of our population gainfully employed in 1890 was 37 percent and in 1932, at the end of a period of 40 years of intensive development in the use of power and machinery, the proportion of our population gainfully employed had advanced to 40 percent. In 1890 8.4 percent of our population were gainfully employed in manufacturing, whereas in 1930 the percentage was 14.3 percent, or an increase of approximately 75 percent.

During the 40 years from 1890 to 1930 real wages advanced almost 50 percent. The productivity of the worker increased correspondingly. This increased productivity resulted primarily from the technological developments which supplemented man power with mechanical power and appliances. Coincident with the improved earnings of workers, hours of work were reduced from an average of 60 per week in 1890 to less than 49 in 1930. The present average is below 40 hours.

The fact is that the progressive improvement in our production facilities and our machines and technological experience make constant increases in the productivity of workers possible. Meanwhile, the living standards of these workers have increased beyond that of the workers of any other country in the world.

Therefore, must we not conclude:

1. That it is impracticable, if not indeed impossible, to arbitrarily fix a uniform work week. That must be left to the determination of each particular industry. It cannot be done by the arbitrary process of legislation or administrative orders. And,

2. Shorter hours and higher wages cannot make for prosperity unless consumer demand is strong enough to meet the increased cost of production.

That brings us to a consideration of the second fallacy in the subject assigned to me, namely, that increased taxation is a basis for prosperity.

I submit that higher taxes cannot make for prosperity. On the contrary, the continuous increases in the burden of taxation are the greatest deterrent to economic recovery.

Taxes are a necessary concomitant of civilized government. Excess taxes are the inevitable result of governmental extravagance. Taxes do not discriminate among persons, they "soak the poor as well as the rich."

History is replete with the tragic results of attempts to soak the rich or to confiscate the property of the prosperous, who are the founders of a nation's industries and the promoters of its progress.

The Athenian Republic perished chiefly because of the taxing of wealth. The Athenians, against the unavailing protest of Socrates and the other wise men, taxed everything to such an extent that business was confiscated and wealth disappeared.

For several centuries Rome was tax-free. Then Augustus instituted an extensive tax system, comparable with our own. In his time the Romans did not encourage commerce and industry. They taught that the creation of wealth should be discouraged. Taxes upon the wealthy became so confiscatory that the leaders of the Republic vanished and Rome fell into the hands of barbarians.

The experiences of France, Holland, Spain, and England, with high taxes, is well known to all readers of history.

President Roosevelt, in his campaign speech at Pittsburgh, October 19, 1932, said:

"Taxes are paid in the sweat of every man who labors, because they are a burden on production and can be paid only by production. If excessive they are reflected in idle factories, tax-sold farms and, hence, in hordes of hungry, tramping the streets and seeking jobs in vain. Our workers may never see a tax bill but they pay in deductions from wages an increased cost of what they buy or (as now) in broad cessation of employment—our people and our business cannot carry its excessive burdens of taxation."

And the President, in his recent letter to Howard, said:

"The broadening of our tax base in the past few years has been very real. What is known as consumers' taxes, namely, the invisible taxes paid by people in every walk of life, fall relatively much more heavily upon the poor man than on the rich man.

"In 1929 consumers' taxes represented only 30 percent of the national revenue. Today they are 60 percent, and even with

the passage of the recent tax bill the proportion of these consumers' taxes will drop only 5 percent."

I quote President Wilson:

"There is a point at which, in peace times, high rates of income and profits taxes discourage energy, remove the incentive to new enterprise, encourage extravagant expenditure and produce industrial stagnation with consequent unemployment and other attendant evils."

President Hoover put the situation concisely in his Richmond address to the governors of the states:

"The aggregate expenditures of national, state and local governments represent more than 20 percent of the national income. We cannot restore economic stability in the nation by continuing to siphon so large a part of private effort into the coffers of government; this abstraction from the people stifles the productivity of consumption and the recovery of employment."

For many years China excelled all other nations in ability to devise ways and means of taxing her citizens, resulting in the impoverishment of the nation. Characteristic of our spirit to excel, we have gone to the head of the taxing class—and of the spenders' class also.

According to a recent study of the Industrial Conference Board more proposals in relation to taxation have been made in the last four years than in any other period in our history.

Today the uncertainties of our fiscal and tax policies more than any other factors, retard the resumption of profitable operation of our industries. High rates of taxation always drive capital from income-producing enterprises.

On every hand we hear complaints of the increase in the prices of the necessities of life, due mainly to the imposition of taxes.

According to a recent Government study the average family consumes 75 pounds of pork and 150 pounds of beef each year. The cost of the 50 pounds of pork in August, 1934, was $18.22. On August 1, 1935, it was $33. The cost of the 150 pounds of beef on August 1, 1934, was $31.86. On August 1, 1935, it was $44.84. The chief cause of the increase in the price of beef was the drought and the increase in the price of pork and other food stuffs. The cause of the increase in the price of pork was chiefly the processing tax of 2.25 cents a pound and the slaughter of six million little pigs in 1933.

The consumer pays taxes in some form with every purchase he makes. During the past two years your rents have increased 10.3 per cent, the cost of your clothing 20.9 per cent and the cost of your food 27.2 per cent.

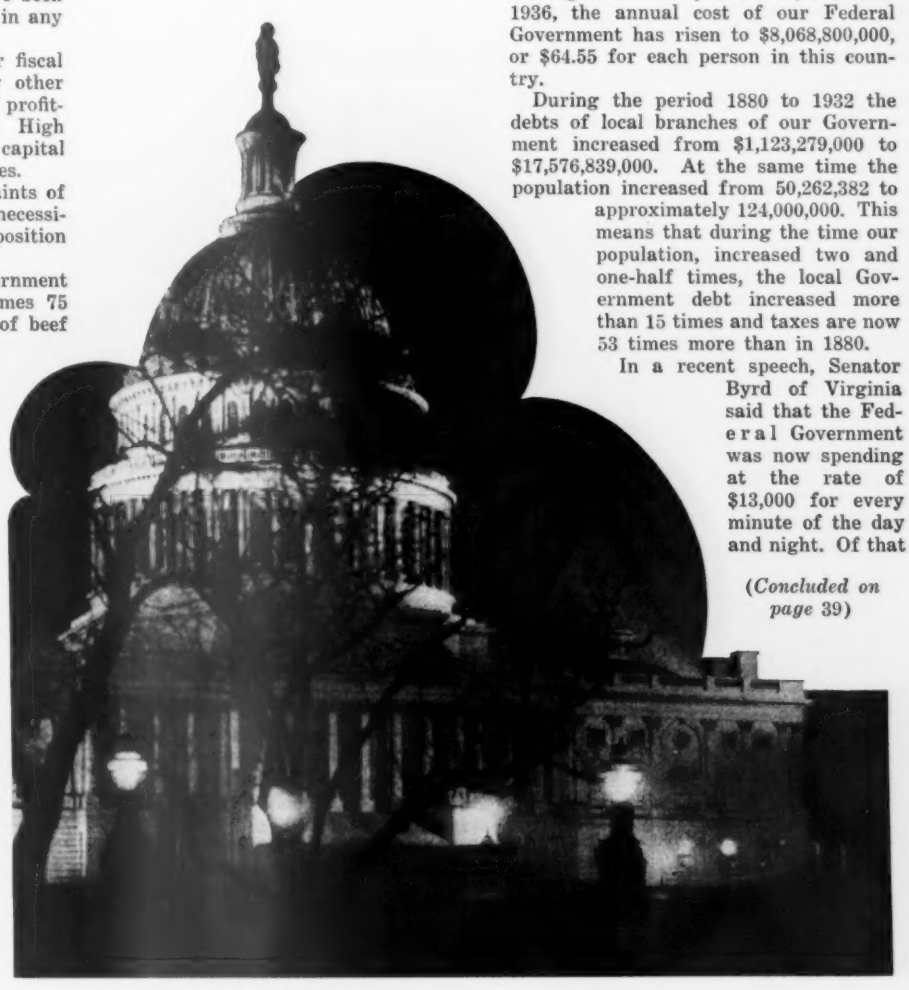
The present need is not so much for more taxes as it is for more income to tax. Obviously, more income means more purchasing power and more revenue for the Government.

Recently we have heard much about social justice. The fundamental basis of social justice is justice to the individual. It is injustice if through taxation, the property of the individual, earned by his enterprise and frugality, is confiscated.

Ultimately taxes must meet all the cost of government.

High taxes are the result, not the cause, of our troubles. The cause is the ever-increasing demands for more governmental service, Federal, state and local. These demands come mainly from politicians or blocs who buy votes with the taxpayers' money, by claiming credit for public works or for getting something out of the "pork barrel." Demands are sometimes made by those who have some selfish interest in more and better Government service. There is little organized resistance to the articulated blocs or groups. Thus the interest of the taxpayers and the general public in resisting the increase of taxes goes by default.

As indicative of increasing governmental activities, I cite the fact that while during the two-year period from June, 1933, to June, 1935, our population increased one per cent, the number of Federal employes increased 25 per cent.



It is customary to assess taxes to meet a part of the cost of government and to borrow the rest, thereby passing on a part of the burden to future generations.

The American people are now paying 9½ billion dollars a year in taxes. The annual cost of all government, Federal, state and local, rose from three billion dollars in 1913 to 17 billions in 1934. In the year 1913 taxes required a contribution of $1 for every $15.50 of our national income. Now the load is about $1 for every $3 of our national income.

The total of Federal, state and local tax collections for the year 1932 was $8,147,000,000, equivalent to more than one-fifth of the value of all production in the United States, the largest proportion in history.

From 1789 to 1913—124 years—the cost of our Federal Government was $24,521,845,000, or at the rate of $195,085,000 per year. This was an average annual cost of $5.26 for each person. During the 20 years from 1914 to 1933, which included the World War, the annual cost rose to $4,697,160,000, or $42.16 for each person.

From the first budget of President Roosevelt to his latest, three years, the United States Government outlines spending $24,206,533,000, almost as much as was spent in the 124 years!! Through the fiscal years 1934, 1935 and 1936, the annual cost of our Federal Government has risen to $8,068,800,000, or $64.55 for each person in this country.

During the period 1880 to 1932 the debts of local branches of our Government increased from $1,123,279,000 to $17,576,839,000. At the same time the population increased from 50,262,382 to approximately 124,000,000. This means that during the time our population, increased two and one-half times, the local Government debt increased more than 15 times and taxes are now 53 times more than in 1880.

In a recent speech, Senator Byrd of Virginia said that the Federal Government was now spending at the rate of $13,000 for every minute of the day and night. Of that

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The Cost of Government and the Value of Property*

By ROSS D. LEISK †

THE changing relationship between the cost of government and the value of property in this country should be a matter of grave concern to every thinking citizen. The value of property is largely determined by its capacity to produce income of some kind. This income may be in the form of the net value of an agricultural crop after the expense of production has been met. It may consist of that portion of a rental which remains after taxes, insurance, and repairs have been paid; or it may be net income from a mine or a railroad or a telephone line. In some instances, it is income of an indirect nature such as rental saved through ownership of the house a man lives in or the store in which his business is housed. It is this ability to produce income for the owner or to save him expense that gives property a value.

The value of property does not remain constant. It is important to note that the value of property is not what it has cost the owner, but what he can sell it for. The purchaser looks at the matter from the standpoint of how much net income he can expect to derive through ownership of the property and how much risk there is of this income being diminished in the future. The smaller the income, the smaller the value; and the bigger the risk, the smaller the value. The value of property, therefore, is quite sensitive to the influence of conditions which directly affect income. Often it is so much so that values tend to vary almost proportionately with changes in income which are of the most temporary nature. Unfortunately, it seems to be human nature to judge future economic conditions by the present. Particularly is this true when, due to some abnormal condition, income begins to rise rapidly. Not only do property values commence to rise with the rise in income, but they soon begin to lead it and to increase in expectation of constantly increasing amounts of income. The results of such expanded values are an intoxication induced by a taste of easy money, a loss of sense of proportion, an impatience on the part of the individual for things he cannot afford and does not need, and a readiness to borrow recklessly in order to get them.

Government is particularly susceptible to these influences and the trend of cost of government is to rise rapidly, not in proportion to the increase in property values but at a faster rate. Appropriations increase, the functions of government are expanded by creation of new boards and commissions, educational institutions are enlarged, curriculums expanded and teaching staffs increased, public officials have assistants to do their work and the assistants have assistants. Now while the cost of government increases when property value rises, it fails to come down when property decreases in value. Thus the diminished income from property is still further diminished by the levies necessary to maintain an expensive government. This further depresses the value of property and starts a truly vicious circle in motion which, if allowed to run far enough, not only devours the income from property, but begins to confiscate the property itself.

An illustration is found by examining the trend as shown by two 10-year periods in Arizona. The year 1914 was a normal year from the standpoint of assessments, budgets and tax rates as these were fixed prior to the outbreak of the World War. The year 1924 was a normal year of the post war period and 1934 was a year in which income from property was at a low level. The figures quoted are total assessed value in the state, the total property tax levy, and the average total tax rate in dollars per $100 of valuation. They are as follows:

Year	Assessed value	Total levy	Average rate
1914.....	$407,000,000	$5,759,000	$1.41
1924.....	650,000,000	15,156,000	2.33
1934.....	357,000,000	16,576,000	4.65

The significance of this is read in the swift increase in tax delinquencies in the state. Tax delinquencies owed to the state were four millions in 1930: they were over seven millions in 1932, and over eleven and one-half millions in 1934. Some of these taxes are delinquent because the owners have not the money with which to pay them; some are delinquent, pending the results of litigation over the assessed valuations, and in many instances, taxes are delinquent because owners have deliberately decided to stop paying taxes which are out of all proportion to their incomes. When taxes are unpaid, the state and its political subdivisions have insufficient money in their treasuries to meet their bills and therefore have to resort to passing out IOU's, somewhat dignified by the name of tax anticipation warrants, to stall off their creditors. These tax anticipation warrants are obligations that must be met and the property owner, even though he has paid his taxes in full, can be held liable for a share of them if they are included in the next budget.

The Arizona property owner is also burdened with a net liability of something like $57,000,000 of bonded indebtedness, which is a direct lien on his property. This is the equivalent of a first mortgage averaging 16 percent on the value of the taxable property in the state. The interest on this is costing the taxpayer over $3,000,000 per year, and at the present rate of redemption, it will take him 33 years to retire the debt. Everywhere in this country, debt service is one of the great obstacles to a reduction in cost of government in keeping with the decrease in property value. The least we can do in this respect is to get along with what we have and turn thumbs down on proposals for new bond issues. As an individual, one cannot say to a bond underwriter, "I have decided to live on a grander and more luxurious scale. My income is not sufficient for this, so I propose to borrow $20,000 against bonds maturing in 40 years and will pledge my children and grandchildren to pay for what I wish to have now, but cannot afford." Collectively, however, we do things just as ridiculous as this and thereby lay an intolerable burden on taxpayers in times of stress.

Cost of government must increase with increase in population, but should not increase in proportion to the increase in population. Once state, county and municipal governments are established and functioning the additional cost of serving

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* Presented to Metal Mining Convention, The American Mining Congress, September, 1935.

† Vice President, United Verde Extension Mining Co.

a 100 percent increase in population need not be anything like 100 percent. In the case of schools, the cost will tend to vary more or less, directly with the increase in population. When, however, we see that an increase of 100 percent in population has been accompanied by an increase of 200 percent in cost of government, we are forced to the conclusion that the new government is more elaborate than the old.

Out of the $16,500,000 levy for Arizona in 1934, about $2,400,000 was for municipal taxes. Out of the $14,100,000 remaining over $8,000,000, or 57 percent went for education. This was made up as follows: $5,900,000 for common and high schools, $800,000 for state educational institutions, and $1,300,000 for debt service. Here we encounter another obstacle to reduction in the cost of government. Education is a touchy subject and it is almost high treason to talk about economies that will hit the schools. Sensible and serious attempts to make substantial reductions in cost of government by enactment of legislation, limiting appropriations, have recently been met with organized resistance on the part of teachers and educational groups who carried their battle to the general public which blissfully imagined that it did not pay any taxes and was, therefore, indifferent to the tax bill. The best friends of education, today, are those who realize that it is better to retain a system that confines itself to the simple fundamentals of sound education than to destroy the whole by an attempt to continue with something that taxpayers cannot afford.

It is dodging the issue to say that cost of government cannot be reduced when income is no longer sufficient to meet it. Whenever cost of government begins to devour property itself, the choice is simply one between voluntary reduction or the more painful and demoralizing reduction that will come later in the form of civic bankruptcy. Coming from a mining state it would not be difficult to illustrate the point by reference to the enforced reduction in cost of government that has taken place in mining communities when they have been relegated to the class of ghost towns by the decline of mining activities.

Owing to the general nature of the topic I prefer to quote in part from the report made by John R. Donahue to the Connecticut State Tax Commissioner's Office on the subject of the bankruptcy of the city of Fall River, Mass. In 1931, Fall River defaulted on millions of dollars of temporary loans. The report summarizes the cause of the trouble as follows:

"1. Dismantling of numerous textile plants in whole or in part because they were unable to compete with mills in the South.

"2. Complete disregard by assessors and city officials of the decline in valuation followed by costly litigation and heavy tax refunds and abatements running into millions of dollars.

"3. Continuation of municipal expenditures on an extravagant scale despite the fact that tax sources were drying up.

"4. The custom of borrowing against future taxes which were based on fictitious property assessments.

"5. Failure to levy a tax rate sufficient to absorb annual deficits and failure and inability to collect taxes levied.

"6. Increase in the net general debt from $4,761,000, in 1917, to $10,209,000 in 1926, which caused debt service to rise sharply.

"In the post war period, Fall River's textile plants suffered from Southern competition with the result that between 1926 and 1931, there was a loss of about 1,500,000 spindles, 33,405 looms, and more than 11,000 employes. . . . All this meant great shrinkage in industrial property values, a situation further intensified by declines in general property values as industrial activity slowed up. Mill owners started protesting in 1921 that their properties were being confiscated by taxation. Nevertheless, city officials went on spending, without heed to the huge declines in property values. . . . When deficits arose, because tax collections were not sufficient to meet requirements, city officials borrowed against the future. The General Court of Massachusetts summed up the situation in these words:

" 'The continued borrowing and spending in anticipation of uncollectable tax levies made repayment of notes impossible; and reborrowing to meet deficits inevitably produced an inverted pyramid which could only topple to the ground.' "

The lesson is simple enough and any branch of government, whether local, state or Federal, which is permitted to follow the road of Fall River will surely arrive at the same destination. The individual who spends more than his income, falls and drags down with him the one whose money he has spent. The government which spends more than its income destroys itself and brings distress upon the people it was created to protect.

Due to the fact that the original purpose of the formation of governments was the protection of life and property, and because the protection of property has continued to be an important function of government, it has long been the custom to assess and tax property for the cost of government. The old time tax gatherer collected a percentage of the crop from the land—in other words, a part of the income. He did not expect to collect all of the crop and part of the land besides. Nowadays, with great increases in population and the complexities of our modern civilization, we have large numbers of people who do not own property, but who, nevertheless, add greatly to the cost of government. These people pay little or no direct taxes and are quite indifferent to the cost of government. To make them tax conscious, they must be taxed directly and property taxes reduced correspondingly. The best thing about a sales tax is that the people know they are paying it and dislike it thoroughly.

The essential items in our cost of government are those necessary for the protection of health, life and property, and the maintenance of a sound school system. These, together with interest and

Ross D. Leisk

sinking fund on our public debts, should form the basis of every budget. The usual budget is merely a list of items for which it is proposed to appropriate money. Its construction is generally a perfunctory and routine matter following past practice and is subject to pressure from all sides for increased appropriations by selfish interests. If cost of government is to be reduced, these budgets must be dissected when they are in the making and every item subjected to the test of absolute necessity. Items that do not meet this test must be dropped whether they be large or so small as to seem trivial. Money saved by elimination of waste and extravagance in government is available for productive enterprise and from this springs new wealth and increased employment.

I do not believe in the abolishment of the general property tax, because the protection of property is still a substantial part of the necessary cost of government, but I do believe that property should be relieved of the cost of protecting the individual and the cost of his education.

I believe that the cost of education and part of the general overhead expense of government should be met by some system of direct taxation that will be more in the nature of a per capita levy. To meet these requirements and to be collectable, it may have to be in the form of sales taxes much heavier than those to which the public is now beginning to object.

Such direct taxation would not only place the cost where it belongs, but would make the people highly tax conscious and would result in an interest in the cost of government by the public such as has never been taken before. Cost of government would be held down and the burden on property would be relieved, both by the load which has been lifted directly and by the influence created toward economical government.

If these things can be done, it may again become profitable for a man to own his own home which is something this country needs today more than anything else.

The Employer-Employe Relationship

By ALBERT MENDELSOHN*

THIS convention of miners affords a particularly favorable opportunity for the re-statement, in its very simplest terms, of some of the fundamental laws governing the employer-employe relationship. This simple relationship has become so circumscribed with artificial rules, so obscured by theories, and so distorted by propaganda that one pictures American industry as an armed camp instead of a friendly business relationship between human beings.

It can be demonstrated philosophically and practically that the interest of the employe and of the employer are the same. This is no new thought. The fundamental principles which govern their relationship have been stated often and clearly. As a group, mine managers have probably had more intimate, friendly and continuous contacts with workingmen than most large employers of labor. Coming from them, a clear, unequivocal statement on this subject should have influence in correcting much loose thought and speech on the employer-employe relationship and should help to guide legislation around many dangerous rocks lying in the path of our industries.

Today much industrial strife threatens; blame for all human and economic ills is laid against the employer of labor; he particularly is being made to appear as the sole obstacle standing between the workmen and their realization of that fuller, richer life. Yet today, as truly as at any time in our industrial history, at the very core of our successful business enterprises lies a strong mutual respect existing between employer and employe. It is difficult to conceive the steady growth of our American industries unless it were fed at the roots by mutual regard and cooperation between these two; the explanation for which lies either in their human or in their business relationships—or in both.

In business a very strong common interest actuates both employer and employe. The more the business prospers, the greater is the amount of gain that may be divided. Over the method and ratio of this division there is sometimes disagreement, but wise employers have learned that "liberal reward of labor increases the industry of the common people." In the words of Adam Smith, "The wages of labor are the encouragement of industry, which, like every other human quality, improves in proportion to the encouragement it receives." Industrial managers have learned that high profits increase selling price more rapidly than do high wages—and high selling price narrows the market and reduces sales. This consideration has led to better organization in American industries, mass production and a willingness to take a very small unit profit on the product of manufacture.

In this connection it is enlightening to read that the profit per pair of shoes sold by a prominent American manufacturer was 8⅛ cents in 1929 and 2⅝ cents in 1930, both good years. The deliberate decrease in unit profits by some manufacturers has not only brought about a widening of the market for their product, but has fostered good will in a manner probably unforeseen at the beginning. It is not unusual to hear working people refer to Fords, General Motors, Sears, Wards, the A. & P., Penny's, and such concerns, with a tone of almost proprietorship, as though these organizations were being operated for the special convenience and help of the man of small income. This is an evidence also of that unity of interest, at the root, between manufacturers and workmen.

The interest in the gain to be derived from business, common to employer and employe alike, certainly, therefore, makes one in essence a business partner of the other and tends to perpetuate the business and increase the profits therefrom. To picture this union of effort toward a common end as premeditated and planned would, of course, be incorrect. Each is moved by self-interest: the gain that will accrue to himself is his chief concern; that the other benefits thereby is secondary and fortuitous. Not less on this account, however, is it a fact that the interest of each in the continuity and prosperity of business is the same interest.

In the division of the gain from business, discord between employer and employe may arise, not alone from the method and ratio of the division, but often because of the undercurrent of feeling that there is a disparity in the degree of economic independence of those who share. In the eyes of some workmen, that share of the gain due the employers goes to those who already have plenty, while that going to the employe is used up in the purchase of only the necessities of life. If such a disparity as this were unique to and only to be found to exist between employer and employe, then indeed there would be cause for serious concern. But from bottom to top of our social and economic structure, between one employe and another, between one employer and another, between individuals, between families and between groups of people, we find every degree of disparity of fortune and every degree of effort on the part of each to alter that disparity to their own benefit. This is the working of another elementary law. Every conceivable form of relationship between people has at one time or another in the history of the world been put to the trial, through Communism in China some 2,000 years ago, to non-profit cooperative enterprises in Sweden today. Never has horizontal good fortune—or bad—remained horizontal. In the knocks and buffets of the world that accompany striving between men—striving with the reward of success and the penalty for failure in clear view of all—we see the forging and tempering of the human being in preparation for the battle of life—a battle that has never been easily won.

In his efforts to continue his business, to increase his profits and to widen the markets for his product, the large employer of labor has become the workman's sincerest and ablest champion in securing for him steady employment.

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In his efforts to continue his business, to increase his profits and to widen the markets for his product, the large employer of labor has become the workman's sincerest and ablest champion in securing for him steady employment. The spectre in every worker's household is the fear of shut-down or lay-off. The employer, in his fight for markets and low costs, is taking practical steps to win for the worker some measure of security against unemployment. Let any government afford to industry the one encouragement which it requires, some tolerable security that it shall enjoy the fruits of its own labor, and it will have gone far in bringing about that social security so desirable to all.

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* General Superintendent, The Copper Range Co.

The Significance of

Silicosis in Mining*

By D. E. CUMMINGS†

NEARLY 400 years ago Georgius Agricola, in his famous De Re Metallica, wrote that "some mines are very dry, and the constant dust enters the blood and lungs, producing the difficulty of breathing the Greeks call asthma. When the dust is corrosive, it ulcerates the lungs and produces consumption; hence it is that in the Carpathian Mountains there are women who have married seven husbands, all of whom this dreadful disease has brought to an early grave." During the decades which have elapsed since this observation was made, the art of mining has progressed to an advanced degree, but the hazards arising out of exposure to dust remain to menace modern miners much as they did those of the sixteenth century. The mining profession in the United States may well afford to pause in its flight through the realm of technical improvement to consider the relationship which their occupation bears to the health of the workmen involved.

In this address I shall deal not only with our present conception of the part which dusts may play in affecting the health of miners but also with suggestions for a broad program designed to cope with the hazards involved. Many operators apparently believe that the reduction of dust concentrations in the mine atmosphere to within some specified limit will accomplish a complete removal of any danger to their workmen. This impression is erroneous, and its continued existence defeats every opportunity for constructive action in alleviating the problems presented. An atmosphere entirely safe for a normal individual to work in for an entire lifetime may be extremely hazardous to the man whose lungs have already suffered injury from some other cause. Many old miners whose working lives have been spent in air containing heavy concentrations of dangerous dust are alive and healthy today, while others whose occupations may have involved far less exposure to dust have long since died of the "miner's complaint" or "miner's consumption" which Agricola so accurately described. The control of dust hazards depends not only upon the very essential reduction of excessive dust concentrations in mines, but particularly upon a recognition of the physical qualifications of the miners who are to be engaged in that occupation.

The atmosphere enveloping the earth normally contains particulate matter generated by the elementary forces, the activities of living things and the motions of mechanical devices. Since man has never exercised control over part of of these forces he has, in the course of his evolution, developed a fairly efficient air-conditioning apparatus throughout the respiratory tract, as well as a considerable tolerance for inhaled dusts. The hair in the nose, the abundant moist mucous surfaces of the upper respiratory tract, the whipping sea of cilia in the bronchi, and the mechanism of cough serve to protect the more delicate structures of the lung from inhaled dusts, a portion of which are also expelled with the exhaled air. Those particles which are retained in the ultimate air sacs of the lung are immediately engulfed by large mobile cells which protect the pulmonary tissues from mechanical injury and furnish the dusts with a possible means of transportation.

Experiments have demonstrated that those dusts which are retained within the lung itself have a well defined size distribution, with none of the particles larger than 10/25,000 inch in diameter, while 95 percent of them are less than 3/25,000 inch in diameter. More significant, however, has been the observation that certain dusts are capable of irritating the cells which contain them, while others provoke little or no response on the part of their hosts. Irritating dusts apparently stimulate the wandering cells in which they are engulfed, causing them to migrate rapidly into the pulmonary drainage system or lymphatics. Some of the stimulated cells come to rest in small catch basins along the drainage system, but the greater number eventually lodge in the cess pools known as lymph nodes which are situated at the root of the lung. At these points the irritating dusts are concentrated in sufficient amount to produce the death of some cells and to provoke the proliferation of others, thus creating tissue changes which will vary with the toxicity and numbers of the accumulated particles. Other dusts display little or no ability to stimulate the cells which have ingested them, and such cells remain in the air sacs lethargically taking in a new particle from time to time but failing to show any evidence of concern over their burden.

Pure crystalline silica surpasses all other dusts in its ability to create the tissue changes described, while the dusts of coal, limestone, gypsum, alumina, or hematite are apparently incapable of producing significant tissue reactions, and can be considered inert. When silicates or mixtures of silica and these inert dusts are inhaled together, the process which would ordinarily develop in response to the silica alone tends to be retarded, and results in a modified reaction.

In the normal individual the reaction to inhaled crystalline silica is characterized by the development of a peculiar type of fibrosis or scar which appears in those areas where silica is deposited within the pulmonary structure. Silica-containing air enters the lung in turbulent motion and the dust is deposited uniformly throughout the entire organ, and since these particles are capable of stimulating their host cells, they are rapidly transported into the drainage

* Presented to Metal Mining Convention, The American Mining Congress, September, 1935.

† Field Director, Saranac Laboratory for Study of Tuberculosis.

system or lymphatics; hence the first detectable evidence of characteristic fibrosis appears in the lymph nodes situated at the root of the lung. Later this reaction will manifest itself throughout the lymphatic system which excircles the blood vessels and bronchi. As the changes throughout the lymphatics proceed, the effectiveness of this drainage mechanism is interfered with and the dust entering the lung is eventually unable to reach the lymphatics, but is thereafter deposited by the transporting cells in selected areas throughout the lung substance itself. Small, discreet, and uniformly distributed fibrous nodules from two to six mm. in diameter may eventually develop in large numbers within the lung, presenting in this stage the characteristic picture of advanced silicosis.

An excellent x-ray film of the normal individual's chest represents a projection of the pulmonary structures cast as shadows of varying density. Prominent among these densities are those cast by the blood vessels, which compose the so-called vascular tree. The fibrous changes initiated by pure silica can be detected in the early stages on a good roentgenogram by the increased densities shown at the root of the lung where the lymph nodes are situated. Further changes throughout the lymphatic system will become evident by an increased prominence of the vascular shadows caused by the fibrosis developing in the lymphatics surrounding these structures. Finally the roentgenogram will reveal as small round densities the uniformly distributed discreet fibrous nodules present throughout the lung in advanced silicosis, giving the characteristic "snowstorm" appearance described by roentgenologists. If the typical reaction described for silica has been modified by the inhalation of silicates or mixtures of silica and inert dusts, the pattern of the pulmonary changes produced will also be registered on an excellent x-ray film of the chest and can be interpreted by an experienced roentgenologist.

When tubercle bacilli are inhaled they are handled in much the same manner as dusts. Once in contact with the tissues, however, they are either killed and disposed of or they set up localized foci of infection. The organisms are transported by cells into the lymphatics and the tissues then attempt to wall off these foci of the infection by laying down an ever thickening mantle of scar. This reaction is much the same as that which follows the inhalation of silica except that it is generally localized to one or more portions of the lung, and may be visualized and interpreted as tuberculosis in a good x-ray of the chest with remarkable accuracy.

Obviously the lung which has been injured by a pulmonary infection such as tuberculosis is far less competent to deal with a dangerous dust such as silica than is the normal lung. Moreover, it has been proved both clinically and experimentally that the inhalation of pure crystalline silica tends to re-activate a pulmonary tuberculous lesion which would otherwise heal, and frequently renders such infection progressive and fatal. Even if the tuberculous lesion has successfully healed prior to the time when silica is inhaled, a far greater reaction to the dust occurs about the site of the old tuberculous scar than occurs in normal tissue, since the drainage system in that area has already been damaged and since the two processes apparently stimulate the tissues to produce an excessive amount of fibrosis.

Recent investigations have disclosed that individuals who have simple silicosis uncomplicated with tuberculosis are not generally disabled, even though their condition may be quite advanced. A careful physical examination frequently fails to reveal anything abnormal about such individuals, and the changes which have occurred in their lungs can be detected only by the x-ray.

Silicotic workmen who complain of shortness of breath, chest pain, cough, or other disabling symptoms are generally found to have either a complicating pulmonary infection, usually tuberculous in nature, or some evidence of a previous pulmonary injury which has left a localized scar. These cases can be discerned on an x-ray film by the characteristic appearance of silicosis to which has been added the large densities cast by the localized masses of pulmonary fibrosis which exist about the sites of the infection or previous pulmonary injury. Frequently such cases fail to show tubercle bacilli in the sputum until shortly before death, and in many instances the disease is unusually chronic and only slowly progressive, manifesting itself largely by an increasing shortness of breath. Cases of this type are the prominent feature among the men actually disabled by the modified silicosis.

Widespread misconception of the disabling effects of uncomplicated silicosis has arisen from the studies of early investigators who were unable with the equipment or knowledge then available to distinguish cases of silicosis from those complicated with pulmonary tuberculosis or other infections. These earlier investigations revealed silicotics who displayed shortness of breath, chest pain, cough, and other disabling symptoms which were ascribed to silicosis alone, since tubercle bacilli could not be found in the sputum. It should be realized, however, that silicosis assumes a serious position as an occupational hazard largely because of its effect on pulmonary infections, predominantly tuberculous in character.

Statistics reveal conclusively that all workmen exposed over long periods to fine crystalline silica dust suffer from an excessive tuberculosis mortality. In certain localities pulmonary tuberculosis alone accounts for from 15 to 20 times as many deaths among silicotics as occur in the general population of the same community. Records of this kind have been demonstrated in many mining communities, but they should not be attributed to the general working conditions encountered underground, for they are equally noteworthy in open air industries which offer exposure to high concentrations of silica. Moreover, the tuberculosis mortality rate among many classes of miners not exposed to silica dust is lower than that found in the general population, while the tuberculosis death rate among those exposed to silicates or silica mixed with harmless dusts generally lies between that for the general population and the excessive rates for those groups exposed to pure silica.

The very nature of mining operations, involving as they do, the disintegration and removal of ore and rock which usually contain silica, renders them dusty and frequently hazardous to the health of the miners. The alleviation of such hazards can not be accomplished merely by reducing the concentration of dust in the working atmosphere, though that is an essential consideration, but demands as a far more important requisite the control of tuberculous infections among the men employed. Let us then outline briefly the procedure which should be followed by mining companies in detecting and controlling a health hazard from harmful dusts evolved in their operations.

After having divested themselves of preformed conclusions concerning their particular situation, and after having informed themselves on the general aspects of dust diseases, the administrative officers concerned with this problem should inaugurate a thorough survey of the operations under their supervision to determine the existence, nature and extent of dust hazards. A survey of this type should include the physical and x-ray examination of all the employes, the taking of occupational records, the determination of the nature and concentration of the dust suspended in the working atmosphere, an analysis of the mortality records in the district, and if possible, post-mortem examinations of old employes dying from any cause.

If no hazard is discovered by such a survey, both the employer and the employe are protected by the information secured; on the other hand, if one is detected, the original study serves as a guide to the future program of control which should be promptly initiated. A control program in a dusty industry whose hazard has been defined would include the reduction of the dust concentration in the working atmosphere, and the application of protective devices, the establishment of certain physical standards for new employes, the selective placement of old employes on the basis of their physical condition, and the adoption of an educational program to inform all those vitally concerned with the effects of a dust hazard.

Thoroughly reliable methods of determining dust concentrations are available, and mining engineers equipped to utilize these procedures can discover the sources and extent of any contamination and devise means of either reducing the

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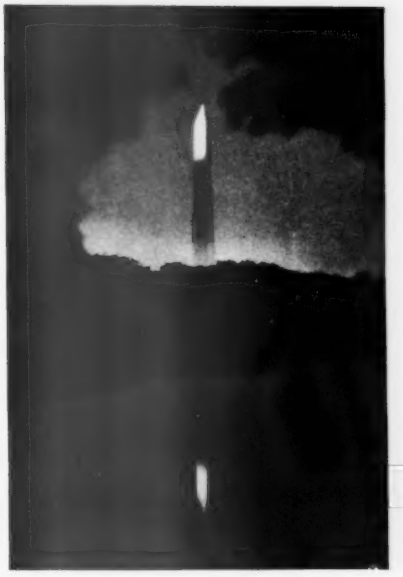
Wheels of Government



WHILE the Congressional and administrative groups are conspicuously absent from Washington at this time, there is little cessation in the activities of the various government departments, which have continued to grind out an amazing number of "dos" and "don'ts." It makes little difference whether the Congress is in session or whether the White House is vacant, the wheels of government roll merrily on.

Interest has centered quite largely around the general business upswing with many different groups taking full credit for the result. However, between arguments as to who is responsible, business does seem to be waging a successful battle. The American Federation of Labor announces that employment is steadily increasing and that there has been a marked decrease in the number of unemployed during the last 30 days. Government statistics continue to show improving conditions in nearly every field with metals well in the lead. The Federation has occupied some of the spotlight due to its convention at Atlantic City, and the difficulties between John L. Lewis of the United Mine Workers of America and William Green, president of the Federation, which resulted in Mr. Lewis' resignation as vice president. Political commentators see in this action of Mr. Lewis, the specter of a competitive labor organization which will add still another labor organization to the list. The old battle of craft vs. industrial unions is getting into full stride. Mr. Lewis is a strong advocate of industrial unions as exemplified by the United Mine Workers, but the Federation group as a whole voted him down in favor of craft unions. Whether or not two organizations result, the breach between the two leaders will not make for better labor relations in industry.

In spite of all of the commissions and the expenditures of vast sums of money, the administration's big problem still remains. That is labor, the wages of labor and the lessening of unemployment. While there are no thoroughly reliable data concerning the unemployed, both the Government and the American Federation of Labor assert that considerable slack has been taken up and that the number has now been decreased to between 10 and 11 million. The National Labor Relations Board now has 36 cases in which it has filed complaints. Hearings have been held in more than two-thirds of these but only one report has been filed upholding the complaint. Complaints against employers in nearly every one of its 21 regions have been filed by the Board, which is evidently taking the position that it has jurisdiction under the Wagner Act in any industrial operation, including mining and manufacturing, which involves an element of interstate commerce. Washington labor circles took a more than ordinary interest in the development of the company union picture. There is a continued and growing aggressiveness on the part of organizations not affiliated with the American Federation, and the more recent split by Mr. Lewis and Mr. Green gives rise to considerable uncertainty as to the future of organized labor as it now exists.

Looming ever nearer is the second session of the 74th Congress, and the legislative picture after the first of January. Commentators seem agreed that three significant factors are involved in the legislative program: the Supreme Court and its action on New Deal projects that will come before it; the Relief Program, with the possibility of further huge appropriations; International issues, which involve such important things as "neutrality, war profits, foreign trade;" there are also the St. Lawrence Waterways and Trade Treaties, the bonus and the silver question which may come in for major attention.

There is much concern about the length of the session. Experience has taught that recent Congressional sessions die hard. The White House is said to desire a short session, with Congress out of the way by the first of March. The more reasonable view is that the middle of April will see the closing of the session. The need for building political fences may be a large factor in its length.

There is considerable comment and speculation concerning the budget which now has the President's consideration, with a weather eye to the blue pencil and much noise about a balanced budget. The constitutionality of the Guffey Coal Control Act is also another highlight, with many test cases being tried in state courts, and with the whole question ultimately to come before the Supreme Court of the United States. Meantime, the Bituminous Coal Commission is getting under full swing although many of the groups cooperating with it are of the opinion that its services will be short-lived. The Berry conference, which is scheduled to take place December 9th, from the Government standpoint is receiving "the hearty cooperation of industry," but echos from large groups in the industrial field would indicate that industry takes a different view, with important groups publicly stating that they will not participate nor cooperate with the movement. The Government contends that this conference is not an effort to revive the N. R. A., and industry insists that the conference is the first step preliminary to new legislation to revive the N. R. A.

The Social Security Act is of paramount interest and the Social Security Board, has been making rapid strides in its plans for unemployment compensation programs and a budget for its 1936 operations. The board hopes to have unemployment compensation plans in operation in a majority of the states early in 1936. Considerable dissension

(*Concluded on page* 42)

Of all things . . .

WASHINGTON and the Nation buzzes about the budget. . . . The President has worn out a box of blue pencils, it is reported. . . . Every energy is bended toward making ends meet. . . . But we'll bet that if they ever do, they'll not recognize each other. . . .

■ ■ ■

And don't think that Canadian-American trade agreement tied the President's hands . . . just because import quotas are "frozen" for the three-year life of the agreement. . . . If the farmers get "tough" the President has his usual ace-in-the-hole. . . . Everybody forgot that the AAA amendments give him power to restrict imports that materially interfere with the AAA program. . . . And the Canadian agreement does not nullify the AAA. . . .

■ ■ ■

We do things in a hurry over here, we get right to the point and get it over with, we proudly tell our slower neighbors across the seas. . . . And so it's something of a problem to explain to them that in order to find out whether or not the Cotton Control Act is constitutional we must wait while a Texas farmer sues a railroad because it has refused to carry his cotton because he hasn't paid the tax on it required by the Act. . . .

The big question before the Congress rolls into Washington is what comes after work relief. . . . Nobody knows yet, but more expense is sure. . . . Here is the problem, based on past experiences in building an army of "reliefers." . . . Direct relief for all on the relief rolls at $1,500,000,000 annually; work relief for relief roll "employables" at $4,000,000,000 annually; production-for-use by relief roll employables at $1,000,000,000 annually; regular work for all job-hunters at security wages to cost $16,000,000,000 annually. . . . The figures are all based on present FERA and WPA statistics. . . . No wonder the Administration is anxious for industry to provide employment! . . .

■ ■ ■

Middle-western farmers are breathing easier as a result of the recent purge of "brain-trusters" from the AAA. . . . The story is that the farmers said: "We didn't object to them because they were from the East, the Near East, or even the Far East, but the fact that they didn't like pork was rather tough on the little pigs." . . .

■ ■ ■

There's been a lot of comment on the President's orders to his police escorts to "slow down" but that order didn't apply to Administration chiefs. . . . In fact an order that sounded something like "get fired with enthusiasm or get fired" is the edict. . . . Last pay day some of the leaders were required to indicate the states from which they come and who endorsed them for the post they hold. . . .

While Major George L. Berry's industrial conference was yet to be held, advance reports indicated it would be the largest non-attended Government conference ever held. . . .

■ ■ ■

NRA Administrator L. J. Martin, resigning, says the work of the "skeleton" staff is nearly completed. What the country wants to know is when the skeleton will stop rattling. . . .

■ ■ ■

The President wants a short Congressional session. . . . So do Senators and Congressmen. . . . Reports are the country is so far agreeable that it would just as soon there wouldn't be any session. . . .

■ ■ ■

The Townsend plan was strong only in the West. . . . Latest report is that it is giving New England politicians a headache. . . . Which makes New Deal politicoes very very happy. . . . Imagine a conservative high tariff Republican having to stump for the Townsend old age benefit plan in order to get elected! . . . And that's just what might happen in rock-ribbed Vermont, New Hampshire, and Maine, according to Democratic advices. . . .

■ ■ ■

Diplomacy a la New Deal: "It isn't true that we are going to crack down on you if you don't do as we say." . . .

■ ■ ■

The brain trusters have been directed to study a newly discovered mocking bird. . . . It can change its tune 87 times within seven minutes. . . .

■ ■ ■

The AAA discloses that the depression didn't affect food consumption much. . . . During the period 1925-29 the average consumer ate 1,474 pounds of food annually; from 1930-33 he ate 1,454 pounds annually. . . . What we want to know is what happened to the 20-pound difference—or was it plowed under? . . .

■ ■ ■

An NRA Consumers' Council expert advises that coloring gasoline red or blue makes it cost more but doesn't make it any more powerful. . . . A lot of people think that adding red or blue coloring to political gas doesn't enhance its value either. . . .

Developing Safety *in* Metal Mines *in the* United States*

By D. HARRINGTON †

MINING has long been considered the most hazardous of the major lines of industrial endeavor. The latest figures issued by the National Safety Council, those for 1934, indicate that, of 30 main industries in the United States, mining (including all types) had by far the worst severity rate—10.19, compared with an average of 1.70 for the 30 industries. Construction had the next poorest rate—4.32. In frequency, mining ranked No. 29 among the 30 industries listed with a rate of 51.45, compared with the average of 15.29. Lumbering alone had a higher frequency rate than mining—83.83. While the figures for mining are based on detailed data from only 168 of the several thousand mining plants in the United States, they give at least a general indication that in 1934 mining in the United States, notwithstanding a definite decrease in the occurrence rate of mining accidents during the past several years, had an accident severity rate about six times, and an accident frequency rate at least three times, that of general industry. These figures roughly parallel the accident-occurrence situation in Great Britain where the mining fatality rate indicated in recent figures is about six times that of general industry.

Having the poorest accident rate of the major industries of the United States gives the occupation of mining a "black eye." The blackness is intensified further by the fact that according to the statisticians the accident death rate of the United States is the poorest or worst of all of the leading nations of the world, Chile alone excepted. Fortunately this dark picture, like practically all dark pictures, has relieving features; otherwise all of us might as well throw up our hands and join the already too numerous ranks of the fatalists who believe that because mining is so inherently hazardous any attempt to prevent accidents in and around mines merely results in time, money, and effort thrown away.

Metal mining people have the satisfaction of knowing that their accident-occurrence rate is usually slightly lower than for either bituminous or anthracite coal mining; moreover, our statisticians give us figures indicating that there has been a very decided drop in rate of occurrence of fatal and nonfatal injuries in metal mines since 1926 or 1927, culminating in the lowest known rate in the history of the industry in 1932. To those who call attention to the fact that metal mining has been more or less dormant for the past several years and say that lack of activity may have caused the lowered accident rate, the rejoinder can be made that periods of depression, in the past, have usually been synchronous with increased accident occurrence in and around mines—the present depression being an exception.

A recent tabulation of the rate of occurrence of fatal and nonfatal accidents in metal mines per thousand 300-day workers shows that for the 10 years, 1911-20, this rate was 224.36; for the next five years, 1921-25, it rose to 276.27 and then dropped to 213.23 for the five years, 1926-30. The tabulation indicates that a decided downward trend in accident occurrence in metal mines started about 1927. This is shown by the following short table:

Killed and Injured Per Thousand 300-Day Workers in Metal Mines of the United States.

Year	Rate
1926	248.48
1927	224.64
1928	208.11
1929	203.14
1930	170.78
1931	142.09
1932	138.46
1933	155.13
1934	Not Available

It will be seen that while there was a more or less steady downward trend in the accident rate from 1926, the real break for the better came in 1930, and that 1932 established a very impressive low rate of metal-mine accident occurrence in the United States. Although the 1933 rate was by no means as good as that of 1932, and there is reason to believe that the 1934 rate was little if any better than that of 1933, yet both of these years will undoubtedly have rates much lower than the rate in any year prior to 1930.

There is no question that present-day thought is veering strongly towards the desirability of taking adequate measures to prevent accidents in all walks of life, including industry. The more the subject of safety is carefully considered and analyzed, the more definitely is it established that safe methods, safe practices, safe equipment, etc., are advantageous to employer, employe, and the general public—not only from an altruistic point of view but also from a more cold-blooded but much more practical one of dollars

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and cents. Compensation laws are becoming more and yet more liberal to the injured employe or his dependents; this is as it should be because there is no question that life and limb are about the most valued possessions of human beings. And there is absolutely no doubt now that the cost of industrial accidents is heavy and that it must be borne at least temporarily by the industry with the ultimate burden upon the consumer in many cases. In some forms of industry of which metal mining is one of the most conspicuous, it is difficult, in fact almost impossible, to pass this burden from the industry to the consumer. About the only protection afforded the industry is to prevent accidents, and this will of course automatically take care of the now important item of compensation for industrial injuries. That the cost of accidents is of importance in mining may at least be inferred from present-day belief that the direct and indirect costs of accidents constitutes 10 to 15 percent of the total cost to the mine operator of putting coal on the railroad cars at the mine. Similar figures for metal mining are not available, but the percentage is probably but little different —at least as regards underground mines.

The worst handicap to safety in the mining industry has been the fact that many, perhaps most, of those in actual control of policies in mines—the presidents, general managers and superintendents—have up to and including the present time looked upon safety, accident prevention, and kindred subjects largely as fads or trivial features. This important work (if acted upon at all) has been thought of as something to be delegated to some old-timer for whom some job had to be provided or to some other person whose services could be secured cheaply and who might be relied upon to "bother" the management or the operation of the property little or not at all. The result has been what any thinking person might well foresee; safety has been neglected, accidents have been so common and so severe that mining has acquired and deserved a very bad name in so far as its effect on the health and well being of its workers are concerned, and only within the past few years have some of the wide awake mining executives (in some instances largely through the instrumentality of the workmen's compensation laws) awakened to the fact that something is wrong and something must be done to try at least to remedy an admittedly bad condition. And oddly enough, very frequently when the higher operating officials of mining companies have gotten behind safety programs personally rather than by delegating the work wholly to the lesser officials, it has been found that mines—deep or shallow, wet or dry, coal or metal—can be conducted with relatively few accidents and that the measures taken to reduce accidents almost invariably increase output and simultaneously decrease its cost. While some excellent safety work is being done without the personal aid of "the man higher up," this is by far the exception and as a rule the best results can be expected only when "the man higher up" gives his personal time and effort to accident prevention work.

These statements are drastic, and probably most mining men in official positions will resent them, yet there is good reason to believe that they have a sound basis of fact behind them. One of the most convincing of these facts is that a number of mining executives have recently made verbal and published statements indicating that when they became personally interested in accident prevention work the rate of accident occurrence in their mining property was reduced materially, and that not only did the employes profit in the reduction of suffering and misery of various kinds which always accompany an accident but both employer and employe also reaped handsome financial returns of various kinds.

Well authenticated cases are at hand in which, through earnest attention to accident prevention, metal mine accident occurrence (sometimes frequency, sometimes severity, sometimes both) has been reduced 75 to 90 percent within a period of five years or less and even 95 percent or more within a 10-year period.

* * *

The latest figures issued by the National Safety Council, those for 1934, indicate that, of 30 main industries in the United States, mining (including all types) had by far the worst severity rate—10.19, compared with an average of 1.70 for the 30 industries. Construction had the next poorest rate—4.32. In frequency, mining ranked No. 29 among the 30 industries listed with a rate of 51.45, compared with the average of 15.29.

* * *

One large copper producer reduced accident frequency more than 97 percent between 1923 and 1930. Another metal mine reduced severity from 10.1 in 1922 to 0.2 in 1931 or nearly 98 percent. A smelting company reduced accident frequency over 80 percent between 1915 and 1932. One medium-sized copper mine reduced its accident rate from 2.46 per 1,000 shifts worked in 1926 to 0.36 in 1933, or about 85 percent, and in 1933 the mine worked over 1,000,000 man-hours. Another metal mining company reduced accident frequency from 64.41 in 1929 to 5.16 in 1933, or about 91 percent, and in the same period reduced severity from 10.96 to 0.077 or more than 99 percent, and in 1933 the mine worked over 500,000 man-hours. One large metal mining company reduced the number of lost-time accidents per 1,000 shifts from 1.047 in 1924 to 0.038 in 1929, or about 96 percent.

Many metal mines are obtaining most excellent results in the avoidance of fatalities. One tunnel-driving operation had no fatalities in driving 17¼ miles of 15-foot diameter tunnel and sinking four shafts for a total of 1,555 feet. One deep iron-ore mine produced about 2 2/3 million tons of ore without a fatality to its approximately 270 employes in a six-year period, and in one of the years worked eight consecutive months without a lost-time accident. Another underground iron ore mine worked eight and one-third years without a fatality, producing nearly 2,200,000 tons of ore in about 3,100,000 man-hours. One underground gold mine operated more than seven years without a fatality to its approximately 250 employes who worked more than 4,000,000 man-hours. One open-cut metal mine moved more than 75,000,000 tons of rock and ore without a fatality to its average force of about 1,400 persons who worked nearly 11,000,000 man-hours. One underground mine produced more than 13,000,000 tons of ore without a fatality, about 4,200,000 man-hours being worked by an average of about 600 persons. Numerous other instances of long-time or large-tonnage operations of metal mines, large and small, underground and open cut, gold, copper, iron, lead, zinc, etc., can be given; and nearly every main mining district in the United States is represented. All of which shows that operation of metal mines for long periods without fatal accidents is not only a possibility but is in many cases an accomplished fact.

Many metal mining companies, especially those in the Lake Superior Iron region, are now not content to reduce accident occurrence, fatal or nonfatal, and are not only demanding but actually getting long time operation without lost-time accidents. Although many marvelous records are known, it is certain that many very fine instances of long-time operation of metal mines without a lost-time accident have not been released to the public. This is decidedly unfortunate because the giving of publicity to well authenticated instances of underground mine operation (coal or metal) without a lost-time accident, acts as a very healthy stimulant to other mines. In numerous instances such stimulation has caused mining companies to surprise themselves by the almost miraculous results which have been achieved.

Metal mines and mining plants have led the way in the operation of mining properties of nearly all types without lost-time accidents, and far too many instances are available to give all of them here. However, the Portland Cement Association has more than 20 plants (all having rock mining departments some of which operate underground mines) which belong to its 1,000 day club comprising plants that have operated for 1,000 or more consecutive days without a lost-time accident. One underground mine producing rock for a cement plant worked more than 600,000 man-hours in a period of more than 6 years without a lost-time accident and in this period produced more than 1,000,000 tons of stone.

An underground salt mine worked more than 800 days without a lost-time accident, the man-hours being more than 400,000. An underground gypsum mine in one and one-half years worked more than 200,000 man-hours without a lost-time accident. A potash company sank a shaft nearly 1,100 feet without a lost-time accident. A metal-mine milling plant operated every day for more than 16 months without a lost-time accident in the handling of nearly 4,400,000 tons of ore. An underground copper mine operated over a year with over 300,000 man-hours of work without a lost-time accident. An underground iron-ore mine worked more than 1,300 calendar days including nearly 700,000 man-hours without a lost-time accident, and in that time hoisted about 750,000 tons of material. Another underground iron ore mine operated over four years producing nearly 400,000 tons of ore without a lost-time accident. An open-pit iron mine operated more than five years with but two lost-time accidents and produced more than 4,000,000 tons of material in about 1,400,000 man-hours, moreover, the property did not have a fatality in 15 years. Another open-pit iron mine operated 32 months, 842,877 man-hours, handling nearly 4 2/3 million tons of material without a lost-time accident. An underground iron-mine operated 948 days without a lost-time accident and in that time produced nearly 700,000 tons of ore and rock much of which came from driving raises and drifts. An underground iron ore mine operated 957 days without a lost-time accident, producing more than 180,000 tons of rock and ore in about 417,000 man-hours; the mine also has a record of more than 1,500 days worked with but one lost-time accident. Another open-pit iron mine worked without a lost-time accident for 55 months handling nearly 1,800,000 tons of rock and ore. During a five-year period one iron ore company operated more than 25 mines, employing over 3,200 persons free of lost-time accidents for 1,256 out of a possible total of 1,770 mine months. A relatively small but deep copper mine worked a full year without a lost-time accident handling 140,000 tons of ore and waste in slightly over 27,000 man-shifts. A rock quarry employed an average of 85 persons for more than six and one-third years without a lost-time accident, the exposure being slightly less than 1,200,000 man-hours. And scores of other more or less similar records of long-time operation of mines, large and small, without lost-time accidents could be given.

That mining can be done without impairment to health or life is amply borne out by the hundreds of available instances in which persons have worked 30 or more years in mines—and by the numerous cases in which men have worked 40 or even 50 or more years in and around mines (coal as well as metal) —without having sustained a single lost-time accident.

While scores of mining companies are now showing by actual performance that mines can be operated efficiently and economically and with reasonable safety at the same time, there is no royal road to safety other than the one which, like anything else worth while, demands expenditure of continued earnest thought and effort. With the metal mines of today, the problem is the more difficult for a number of reasons. Perhaps the outstanding one is the fact that, in general, metal mines are small—experience shows the small plant to be much less amenable than the large one to safe performance or operation. Moreover, leasing in relatively small units is more or less prevalent in many sections of the United States—and the safeguarding of workers engaged in the small unit leases usual in metal mining is a decidedly difficult problem.

RECOMMENDATIONS FOR DECREASING ACCIDENTS IN METAL MINES

1. Every mine, large or small, should have a definite, actively and constantly functioning safety organization.
2. Every mining company, large or small, should educate its workers, including the bosses, in safe and efficient mining practices and methods.
3. There should be a supervisory official or boss for about every 25 men.
4. Every mine should have in printed form (and preferably in a small pamphlet which may be kept in the pocket) its minimum safety (and possibly efficiency) requirements.
5. Send to every employe from time to time mimeographed or multigraphed letters signed by the president or general manager or some other high official.
6. An adequate field force of State inspectors should be available for the furtherance of an intensive and continuing safety campaign in the metal mines.
7. Give training in first-aid to the injured to the entire personnel.
8. Safety contests between mines or departments of mines are used to advantage.
9. Give all prospective employes a rigid physical examination both before being employed, and at intervals of not to exceed a year during employment.
10. Every metal mine operator should recognize the hazard of fire and every mine should have a fire-prevention and fire-fighting plan.
11. There should be a rigid inspection and written report by a competent electrician at least as often as once every month as to the safety of all electrical wiring, machinery, etc.
12. Blasting should be done only at the end of the shift, or possibly by shotfirers after the general shift has left the mine.
13. Require the use of protective clothing.
14. Supplying up-to-date electric cap lamps for the mine workers.
15. Mining companies should take heed to the menace of dust disease.
16. Mines should be well ventilated, preferably by mechanical control.

The following suggestions may be of help in connection with the effort to decrease accidents in metal mines:

1. Every mine, large or small, should have a definite actively and constantly functioning safety organization preferably with the operating head of the company, or of the division or the mine, taking personal lead. The organization should have active participation of all bosses and, if possible, all surface and underground workers—or committees of them.

One of the functions of the safety organization should be to have some person or persons designated to investigate and report on all accidents trivial or otherwise. In every case, the cause should be determined if possible, and the data from these investigations and reports should be used in the effort to prevent other accidents or repetition of the ones which have occurred.

2. Every mining company, large or small, should educate its workers, including the bosses, in safe and efficient mining practices and methods. One of the fallacies, which probably more than any other has contributed to the present unsafety of mining, is the almost universally prevalent idea among mining men that the miner of long experience knows how to protect himself. The cold fact is that the usual old-time miner reads practically nothing on safety or efficiency in mining and hence knows little or nothing but what he himself has seen or what he has learned from some equally poorly informed miner—or boss who has just emerged from the ranks of the miners.

3. There should be a supervisory official or boss for about every 25 men. This official should be "always on the job" during the shift to oversee the work and to protect the interests of the company as well as the safety of the employes. This will not be an additional cost to the company because definite experience in many parts of the country and in practically all kinds of mines shows that if the supervisory official or boss is properly trained in his work (including both safety and efficiency) he can save much more than the amount of his wages. Every mining company should have a training school for bosses

at which attendance is compulsory, irrespective of the candidate's experience or supposed ability.

Since there are fewer than 4,000 operating metal and nonmetallic mineral mines in the United States and there are nearly 100,000 workers, it is manifestly much easier to give safety education to the approximately 10,000 officials and have them transmit the information to the other 90,000 workers than to try to reach the entire 100,000 directly. This is where intensive supervision and discipline come in—and by discipline is meant the establishment of common-sense up-to-date regulations, seeing that they are transmitted to the men by a sufficient number of bosses kept well trained in safety and efficiency, and insisting that these regulations be obeyed without reservation or delay, rather than "hard-boiled" methods of handling men.

4. Every mine should have in printed form (and preferably in a small pamphlet which may be kept in the pocket) its minimum safety (and possibly efficiency) requirements. The pamphlet should have arrangements for alterations, additions, etc., from time to time. These rules or regulations should be specific, should conform to the state law (but they should go far beyond the requirements of the state law, as no state has mine safety laws or regulations which are anything like up-to-date or adequate), and every employe should be kept thoroughly familiar with these requirements. As is the practice with many progressive companies, the employes should be examined from time to time on the safety rules and regulations. Every employe (including bosses as well as other workers) is entitled to have definite information as to the minimum safety requirements of the company and all companies have an obligation to their officials, employes, and the public at large to put their minimum safety requirements in definite tangible form. Probably the best method of conveying this information and of keeping a continuing permanent record of it is by means of printed (pamphlet) rules or regulations, and hundreds of up-to-date mining companies issue their rules in this way.

5. An excellent method used by some mining companies to keep employes informed about safety and other requirements or developments is to send to every employe from time to time mimeographed or multigraphed letters signed by the president or general manager or some other high official. At some mines these letters are sent to the home of the worker, at others they are delivered to him at his working place. Personal delivery is far more effective than the posting of typewritten letters. Several companies using this system have had very good safety records, though, of course, other safety methods were also used.

6. An adequate field force of state inspectors of metal mines in the United States is woefully inadequate but it should be available for the furtherance of an intensive and continuing safety campaign in the metal mines of the United States. As a prerequisite these men should be authorized to attend safety meetings such as those of the National Safety Council, both within and without the state. In addition they should be supplied with membership in the National Safety Council, or other similar organizations, to enable them to keep in touch with up-to-date data on safety in mining.

7. One of the cheapest, easiest, and at the same time one of the most effective methods of bringing safetymindedness to the mining personnel, officials as well as miners, is to give training in first-aid to the injured to the entire personnel. First-aid training does not reach anything like its full effectiveness unless *every person* above and below ground takes it. When first-aid training is given to but a relatively few persons at any one mining plant it is just as ineffective as if but five or ten persons out of every 100 in underground mining were to know how to protect themselves from falling rock or from haulage, explosives, and other types of dangers. With the entire personnel *kept* trained in first-aid the training becomes valuable in *preventing* accidents in addition to helping to minimize their ill effects if they should occur.

8. To stimulate safety in mining, safety contests between mines or departments of mines are used to advantage. Also salary and other types of bonus to bosses whose personnel achieve or excel predetermined safety accomplishments are productive of much good. Some companies recognize individual workers who work stated periods (such as three months, six months, a year, or longer) without lost-time accidents; one company has given a copper button for three months work without a lost-time accident, a silver button for six months, and a gold button for a year without a lost-time accident. The giving of some sort of reward for safety performance is very much worth while and this is particularly the case where penalties for infraction of safety rules are in force.

9. Every mining company, large or small, owes it to itself, to its employes, and in a large measure to the public to give all prospective employes a rigid physical examination both before being employed, and at intervals of not to exceed a year during employment. While mining can be made relatively safe, it is futile to deny that it is a strenuous calling; persons with defective hearing, eyesight, respiration, heart, etc., should not be employed in mines where they are a menace to themselves as well as to their co-workers. It is far more unjust to employ a physically defective person in a mine (where he may acquire further and more serious physical deficiencies or possibly suffer death, or may cause co-workers to be killed or injured) than to refuse him employment upon learning of the defect, or even relieve him of employment if he becomes physically defective to the extent that he endangers himself or others. If more care were taken in hiring mine employes (bosses as well as the other workers) and in their instruction upon employment and afterwards, not only safety but also efficiency in mining unquestionably would be materially increased.

10. In recent years metal mines have been fortunate in having avoided fire disasters causing heavy loss of life. The word "fortunate" is used advisedly because the absence of disasters has been due more to good luck than to any considerable amount of effort on the part of many mining companies. Metal mining people, and more especially those of the United States far too generally believe that mines producing gold, silver, copper, lead, and similar materials have no fire hazard. As a matter of fact there

(*Concluded on page* 40)

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Consistency on the part of the mining companies demands that they first "put their own house in order" before asking or requiring the employes to alter the old for the newer and safer practices. This means that mines should be well ventilated, preferably by mechanical control; that well-constructed cages or man cars be supplied to transport the men into or out of the mine; that all mines have more than one exit and that all exits have well-placed and well-constructed fire doors for use in case of necessity; that all cages have practicable and workable doors, used at all times when men are aboard; that all openings to shafts, winzes, raises, or steep inclines have adequate doors or other device to prevent men or material from falling into them; that ladderways, shafts, raises, or winzes over 70 degrees pitch have platforms at least every 30 feet and that ladders and ladderways be kept clean and in good repair; that all machinery be kept adequately guarded; that timber supply be ample, of correct size, length, etc., and placed reasonably close to the point of use, etc. And finally, all officials should certainly observe and obey the rules and regulations scrupulously at all times.

* * *

The Safety Factor In Mining*

By GEORGE MARTINSON †

THE figures presented by Mr. Harrington in his paper very forcibly call our attention to a very serious situation in our industry. To know that mining has perhaps the highest accident rate of any of the 30 leading industries in the country, should awaken us to a fuller sense of this very serious problem. As I recall the 30 years that I have spent in the mining industry, I recognize the fact that great strides have been made in efficiency, and I wish that I might say that the mining industry throughout the United States has made equal improvement in their accident rates, but that statement cannot be made in view of the startling figures presented in Mr. Harrington's paper. There is no consolation to us in the mining industry to have Mr. Harrington indicate that our record about parallels that of Great Britain. In accident severity our rate is six times that of industry in general and in frequency, three times that of industry in general. It is our duty to look at the situation squarely and determine that the next few years will bring a decided improvement in these rates. I presume that mining executives, as a group, are composed of a larger percentage of well-educated and trained men than a great number of the other industries which have a lower accident rate. It seems strange to me that these highly trained men, coming out from our universities and expecting to become executives in this great industry, have not had a finer appreciation of this great problem. Perhaps the engineering schools have been negligent in not including in their courses subjects that would have a tendency to impress upon the students a finer appreciation of the human element in industry. Perhaps all their time has been taken up with teaching of the purely technical parts of the engineering profession, and they have not found the time for work along the lines I just mentioned. I sincerely hope that the men coming out of our engineering schools now are receiving training along these lines, so that they will recognize the seriousness of the situation and be prepared to attack the problem in an intelligent manner.

I have been asked to discuss this paper with particular reference to the iron ore operations in Minnesota. I have attempted to obtain figures for comparison with the figures given us by Mr. Harrington, but there are no such figures available wherein all of the mining companies in Minnesota are grouped, so I have had to depend on the figures of one of the larger operating companies. Mr. Harrington states that the average severity rate for the mining industry, nationally, during 1934 was 10.19. This operator whose records I have available had a severity rate of .11 percent, or 1.08 percent of the national rate. Mr. Harrington's figures for the frequency rate are 51.45, while the frequency rate of this mine operator is 2.03 or a little less than 4 percent of the national rate. These figures, of course, indicate that this particular operator has an infinitely better rate than the industry generally. I have reason to believe that while perhaps the rate for all of the mining companies in Minnesota might be a little higher than of this one operator, yet it is an indication to me that, generally speaking, the situation in Minnesota is much better than in the industry generally. Fine as this record is, it is one that can be obtained in any mining organization, but I assure you that it does not come from just hoping for it. It requires consistent effort by not one individual, but by a group of men who are convinced that accidents cost too much money and are unnecessary. It is my opinion that every accident that occurs is an indication of inefficiency and should be so considered by the management.

Real definite accident prevention work was started in Minnesota approximately 25 years ago and having been connected with this movement practically from its inception, I personally know all of the discouraging and disheartening things that are met with in an accident prevention program. Mr. Harrington has stated it correctly when he says that safety must come down from the heads of the various companies and then filter through to the men actually on the job. I am optimistic enough to say that, if in the coming ten years, every mine manager in this country could indicate to those he directs that there is no excuse for any accident on the job and will accept no excuses, at the end of that ten years, mining would not be the most hazardous industry in this nation. The splendid records quoted by Mr. Harrington in his paper can be achieved by any organization who wants those results.

The 17 suggestions contained in Mr. Harrington's paper cover quite thoroughly a general program for accident prevention. Any mining organization that would follow his outline would achieve very pleasing results.

Our experience has taught us that there are no permanent gains made unless the program is continuous, when times are bad and when times are good. The companies who have had the best results are those that keep on working at safety even if business conditions are poor.

When the company has shown that they mean business by being willing to spend the money required to guard all of their mechanical equipment in the most approved manner it can then appeal to its employes to actively cooperate in this program and if it continues to keep the spirit alive, the workers will respond splendidly. However, if the workers begin to feel that there is a lack of sincerity on the part of the management, the reaction will be just the opposite.

In Minnesota, of course, the biggest part of the operations are in the open pits and the beneficiating plants connected with them. The operation of the pits themselves are, to a large extent, a railroad operation with the consequent hazards. In addition to this, we have hazards from other sorts of power equipment such as shovels, cranes, and other machinery. We, of course, have the hazards from working in high banks of various types of material, and the handling and use of vast quantities of explosives.

It would be impossible for me, in the short time I have for the discussion of Mr. Harrington's paper, to describe in detail the various types of mechanical safety devices which have been installed on our equipment. I believe that I may truthfully say that in our Minnesota operations we do not have a piece of mechanical equipment that has not been provided with the most approved type of safety devices which can be purchased or made in our own shops. All gears are completely enclosed and all moving parts where there is even a remote possibility of a workman coming in contact with them, have been completely enclosed. The manufacturers of mechani-

* Presented to Metal Mining Convention, The American Mining Congress, September, 1935.
† Pickands Mather Company.

cal equipment have learned by this time that any equipment purchased by our company must have all of these hazardous places protected when the machinery is built, and for the past few years practically all equipment that has been purchased came to us from the manufacturer guarded so well that very little work was required by our own organization to secure the utmost protection.

We have been very careful in our operations in high banks and make generous use of bank trimmers and watchers when there is any question at all about the caving or the dropping of material from these banks. In this connection I might add that several years ago when the mines were working night shift we made a particular effort to secure better lighting not only of the banks in which the shovels were operating, but also of the entire working areas of the pits. In some cases we were able to floodlight the entire area with a consequent remarkable reduction in accidents on the night shift. I understand that all modern power shovels are now equipped with splendid artificial lighting units so there is no need for anyone to have a shovel operating in a bank without sufficient light to make the operation a safe one.

The safe handling of explosives was quite a problem to us at one time, but the manufacturers of explosives are improving their product, and we have adopted the rules for handling explosives as suggested by the manufacturers, and we are experiencing but very little trouble from that source.

Mr. Harrington's reference to electrical installations does not apply only to underground, but also to open pit operations. The extensive use of electricity in our open pits has added new problems and perhaps some of them are not as yet solved. I am thinking particularly of power cables running to various pieces of equipment. It is, of course, very essential that proper grounds are maintained at all times, and I believe that the manufacturers of this equipment will have to devote some time to designing a new type of cable which will assure us these grounds are in better condition. In Minnesota this year a fatal accident occurred due to an insufficient ground of an electric shovel. Since that time other operators have made various tests of the grounds and their cables, and in a number of cases have found that they were of insufficient capacity to protect from injury. I am told that cable manufacturers are trying to solve this problem, and we may look forward to some improvements in this equipment.

Mr. Harrington suggests that printed rules containing safety requirements be in the hands of all employes. We tried this 25 years ago. Our rule books contained very specific requirements for almost every activity of the workmen. Upon examination of the men, we found that they were not entirely familiar with all of these regulations. Instead of conducting regular classes to examine our employes, we discontinued these rule books and substituted for them a very short and concise set of rules that was placed in the hands of every workman and posted on bulletin boards. These rules are simple enough so that there is no question but what the workmen can undertsand them very thoroughly. At the same time these few simple rules were instituted we set up a system of discipline for violation of these rules. This plan has worked out well. However, the foremen and men in supervisory capacities were provided with more extensive rules and regulations, showing the minimum safety requirements for all types of equipment and work. We are now considering a revision of both of these sets of rules and regulations, taking into consideration later developments. I would hesitate to place in the hands of the ordinary worker too complicated a set of rules. My idea is that if a few simple, essential rules are set up for the working men and these coupled with a system of reasonable discipline, it is much easier to enforce them and to secure greater respect for those officials trying to enforce these regulations.

There may be some who disagree with Mr. Harrington in his comment that the old, experienced worker is not the safest man. I agree with Mr. Harrington thoroughly, for our experience has indicated that the old, experienced miner has been harder to convince that there are now better and safer methods of mining than he perhaps knew. The older men have formed many bad habits, and it is quite an undertaking to change those habits, particularly after they attain middle age and have had a long experience in mines.

We have made use of safety contests and found them very valuable and have used inexpensive bonus systems which have served and are serving a very useful purpose. Protective clothing, in shape of hard-toed boots, is being introduced at the present time, and we hope that in another year or so our workers will buy this clothing without urging on our part.

Some years ago, the Bureau of Mines approached us with the idea of training all of our men in first aid. Previous to this time we had about 10 percent of our workers who had been trained and who constituted the first-aid teams on each job. We did not respond very quickly to suggestions of the Bureau of Mines, but five and a half years ago we decided to try out their suggestion, and on December 1, 1930, 100 percent of our workers at the Minnesota Mines had received first-aid training by the Bureau of Mines. It is rather hard to state definitely just how valuable this has been in our prevention program, but I am confident that it has played no small part in it, and I would highly recommend to all companies that they make use of this service. It can do no harm and may do a great deal of good.

Mr. Harrington has mentioned the physical examination of employes as a very essential part of the safety program. I want to whole-heartedly endorse this statement. For 19 years we have been examining all of our employes before entering our service, and for the last 15 years we have been requiring an annual re-examination. I consider this as one of the most necessary parts of a well-rounded safety program. I warn you, however, that simply making the physical examinations and making no further use of the information will not bring results. We have found that by making use of the information obtained from these examinations, we have been able to assign men to work for which they are physically competent, and it has never been made use of to discharge any employe. We have found at various times through our annual re-examinations that it became necessary to transfer temporarily, and in some cases permanently men from one type of work to another, but this was never done without some one connected with the management sitting down and having a confidential talk with the employe concerned, and in every case we have found that the workmen were willing to accept this new assignment. In most of the cases, after submitting to treatment, these men have been able to return to their regular occupations. Mr. Harrington's statement in regard to physical examinations is short and to the point and should be given a great deal of consideration in any accident prevention program.

I find it hard to agree with the point made by Mr. Harrington that under present conditions employers do not have the control over employes that they had in the past and that as a result of this, it will be more difficult to introduce and promote a safety program. I am optimist enough to feel that the workmen engaged in the mining industry in this country will be just as responsive to the introduction and the promotion of safety under these new conditions as they perhaps were under the old conditions. As a matter of fact, I would not be surprised that if the management neglects to promote safety that the workmen will probably initiate such a program themselves.

In conclusion let me say that there is one organization in this country that has always been a leader in promoting safety in the mining industry, and that is the United States Bureau of Mines, and I wish to compliment them and thank them for calling our attention to many important matters which should have our consideration. Much of the success that mining companies have had in promoting accident prevention has been due to the inspiration given us by such men as Dan Harrington. While there may be times that we disagree with him, yet he has been a fighter and has made us think seriously of many of the problems that have previously escaped our attention. Finally, as one who has spent many years in this very enjoyable work, I believe that I can truthfully say that there is no line of endeavor or no achievement that can be more pleasing than to be a part of the movement that has as one

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Development *of* Safety *in the* Iron Mines *of* Michigan

By WILLIAM CONIBEAR*

A DISCUSSION of this subject may well be prefaced by pausing to inquire what progress has been made since 1911, when many operators, recognizing the seriousness of the accident situation, decided to take steps necessary to safeguard employes. After 25 years' experience in dealing with this problem, we surely have gone beyond the pioneer stage, and we now should be in position to indicate what success is possible in accident prevention work. To discuss the effectiveness of safety measures in an attitude that assumes that the control of mine accidents in their final analysis has been achieved in a particular mining district, would be to follow the path of error.

The average annual fatality rate of the Michigan iron mines from 1901 to 1910, inclusive, was 4.60 per thousand men employed. For the 20 years' period from 1910 to 1930 it was 2.75. During the past four years the trend has been downward, averaging below 1.50 per thousand 300 day workers. The non-fatal injury rates also have dropped consistently year after year. Since 1930, the average annual rate has been below 50 per thousand men, as compared with an average rate of 200 for the years from 1910 to 1915. These figures mean that today the death frequency by accidents at our mines is less than one-third as high as it was for the years prior to 1911, and the non-fatal injury rate is one, as compared to four for the earlier years.

To what extent are present-day accidents preventable is another inquiry pertinent to this discussion. A description of all accidents, with full explanation of the circumstances which have a bearing upon the underlying causes or conditions responsible for their occurrence, is essential for an intelligent answer to this question. Lacking this information, I avail myself of the accident record of the mines of The Cleveland-Cliffs Iron Company, but, in doing so, it is with an appreciation of the fact that great caution is necessary at all times in the advancing of conclusions from more or less statistical material. It is quite possible that the relative degree of preventability of all mine accidents is approximately indicated by this comparison.

The accident record of this company compares favorably with the statistics already cited. As its fatality and injury rates have been reduced, the preventable proportion of each year's accidents increased and the non-preventable proportion decreased. In the past four years it has sustained but one fatality whose occurrence was thought to have been beyond control, and 75 percent of all non-fatal injuries was accepted as due to failures to conform to well-defined safety standards on the part of both the supervisory force and the employes.

* * *

It has been said that "progress of an appreciable kind, in any department of social activity and achievement, takes place only and when, and in proportion, as the men who are working to produce a desired result show superior capacity and efficiency in work for that result," and also "that every business, in fact, every industrial enterprise, succeeds or fails, not according to the amount of average labor involved in it, but according to the talents and energy by which labor is directed." Of mine safety, combining as it does both social and industrial attributes, it likewise may be said that in the domain of this field of human endeavor the mine executive is the agent of progress by virtue of the results, being what he is, he causes to be produced by others.

* * *

These preliminary statements require no comment. I think that they may be accepted to validate the conclusion that, while great advances have been made in the establishment of safety at our mines during recent years, the opportunity for greater success lies before us.

In fairness it should be said that the effectiveness of safety remedies has not been solely instrumental in the conserving of life and limb indicated by this resume of our accident record. Other factors have played an important role. A period of expansion, yielding to one of contraction in our industry, eliminated many small operators, curtailed expansion and development at the active mines, and provided a choice selection of skillful labor. The inestimable benefits accruing from these factors to safety should be acknowledged.

A summary of the many effective safety practices in vogue at the Michigan iron mines might be carried to monotonous lengths. It will suffice on this occasion to mention a few of those which have had significant application to the safety structure of the various activities closely interwoven in the mining industry.

Many years have passed since the search for mine safety in the Lake Superior District was a haphazard pursuit. Today organized effort for the promoting of better conditions is a policy that permeates shop, pit, shaft, drift, and stope at every mine. Furthermore, the widest dissemination of the most up-to-date data concerning the basic facts of accident prevention work is everywhere freely discussed. I fear no contradiction in stating that the iron mine, or copper mine, does not operate in the Upper Peninsula of Michigan where the importance of a sound safety program is not accepted on par with production. I know no operator who is unwilling to fall in line with the march of progress in combating danger and correcting unsafe practices.

In the experimental days rules and regulations and mechanical devices may have been looked upon as synonymous of safety. We know from experience that mechanical appliances will always

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Methods of Underground Dust Control*

H. M. LAVENDER †
G. B. LYMAN ‡

G. B. Lyman

THE problem of dust control and allayment, both on the surface and underground, has been a subject of study at Bisbee over a long period of years.

Continued expansion of the underground workings, both vertically and laterally, and the subsequent increase in temperatures with depth, led to the necessity for improved ventilating systems. Greater volumes of air at much higher velocities became necessary. These ventilating currents traveling long distances through dry areas and stoping zones are a most potential source of dust distribution. Over a period of years considerable experimenting, looking towards the alleviation of this problem, had been done. These took form along the following general lines and the efforts made with results obtained are as outlined below:

1. Reduction of dust in air by extensive wetting of drifts and use of water sprays in the circulating air stream.

Result: Some reduction in dust was obtained when all areas were thoroughly and continuously sprayed, but the benefits of lessened dust content were more than outweighed by the disadvantages of the subsequent raising of the humidity in a mine, where this is always a major problem. Also the introduction of excessive amounts of water leads to the rapid corrosion and destruction of rails and hardware due to the large amount of soluble copper and iron salts present in large areas of the mine.

2. Reduction of dust content by oiling main air courses and haulage drifts.

Result: This was attempted on a small scale, but in spite of the fact that an oil was used which on the surface was not objectionable because of odor, it was not successful for the following reasons:

(a) Objectionable odor when used underground.

(b) Limitation to untimbered areas because of fire hazard.

(c) Introduction of a fire hazard.

(d) Prohibitive cost;—with greatest efficiency as a dust collector and preventative at time of application, but a rapid absorption by the ground materially lessens the useful life.

With this background, it was realized that the material used, to be practicable, must answer the following requirements:

(1) It should not add materially to the humidity of intake air.

(2) It should not in any way add to the physical discomfort of the underground force.

(3) It should not complicate in any manner any phase of underground operations.

(4) It must be reasonable in first cost and with no involved technique in application.

As a result of the previous work, it was decided to investigate the use of hygroscopic salts, which it was hoped might be applied and through their properties of absorbing atmospheric moisture, for a period of time, maintain in a dampened condition those mine areas where application was possible. Consequently, the choice of material that would best fill the requirements outlined above narrowed down to common salt (NaCl) or calcium chloride.

For comparison and experimental purposes, air locks were chosen, in a dry, dusty part of the mine, through which there was a considerable leakage of air. Also, when both doors of the lock were opened simultaneously an immediate loading of the ventilation system with dust resulted. Saturated solutions of both sodium chloride and calcium chloride were accordingly prepared and the bottom of the drifts within the locks wet down with the respective solutions.

Over a period of time the sodium chloride solution maintained a dampened condition, while the calcium chloride very shortly dried up. Continuation of the experiments produced no change in the first results, so it was decided to embark upon a trial period on a more extensive scale, using the sodium chloride. A carload of the common unrefined rock salt, about the size of a pea, was purchased and the following procedure adopted.

Dry areas, in active parts of the mine, where high velocity air currents and haulage were maintained, air locks, station approaches and intakes and discharges of ventilating fans were chosen for initial treatment. A 200-gallon tank mounted on a standard mine truck and capable of transportation throughout the mine was constructed. The two ends were separated by a perforated baffle plate. In one end, 400 pounds of salt were placed and the remaining space filled with water. Compressed air was provided for agitation and pressure for applying the solution. The tank was slowly run through the drifts and the saturated solution discharged through hoses, by means of which the back and sides of the drifts were washed to remove all accumulated dust and the bottom of the drifts thoroughly wetted. Following this, dry salt was sprinkled on the bottom of the drift, the amount used depending upon the factors involved.

The immediate effect of this work was the elimination of part of the circulating dust load and the maintenance of the drifts in a generally damp condition with no increase in humidity.

The first work attaining a favorable result, the work was extended throughout the mine and a general campaign of dust elimination begun.

The present practice is to use the pressure tank and a saturated solution when dust has accumulated in the back and on the sides of drifts. This is an occasional process and only in heavy blast-

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ing areas is it necessary to frequently apply the salt solution by this method.

Where average underground humidity prevails the procedure is to merely sprinkle the dry salt on the bottom of the drift or other working. The salt is sent underground in bulk in standard mine cars and a man merely pushes the car along and scatters the dry salt by hand or with a small shovel. It is necessary, of course, to avoid applying the salt too thickly, as a muddy condition will quickly result with excessive amounts. One man will cover several hundred feet of drift per shift in applying the bulk salt.

Realizing that there was a lack of knowledge of the operations that were the greatest contributors to the dust problem, an extensive study by the Engineering Department of these different operations and a series of dust counts and air analyses were started. Unfortunately, by the time that these determinations were initiated the salting campaign in the mine was well under way so that the benefits to the mine as a whole are not definitely known. However, as a basis of comparison the results shown in Table I are indicative of the improvements obtained in certain areas. These results were taken from widely separated places underground and represent the average of the many samples taken.

The following information gained from the extensive studies of dust conditions both underground and on the surface is submitted and discussed in a general way. The order of discussion is the judged order of importance of the various operations from the viewpoint of dust prevention.

I. *Ventilation.*

Affecting as it does all of the underground operations the proper control of the ventilating currents is most essential.

Dust counts taken throughout the mine plainly indicate the points of greatest concentration and were used in all attempts to better conditions.

In all of the preventative and correction work at Bisbee the concentration of 10,000,000 particles per cubic foot was taken as the maximum permissible limit.

Southern Arizona is essentially a dry, dusty region during a large part of the year. Samples taken at the collar of the shaft indicated that where there was any traffic, as around the collar of an operating shaft, high initial dust counts of the mine intake air were prevalent. This of course lowered the margin between the maximum allowable content by a large percentage. Accordingly the areas immediately surrounding the downcast shafts were oil treated, with the result that the average intake air did not differ greatly from samples taken throughout the surface of the Warren District. It is worthy of note that in many places on the surface the dust content of the air on dry windy days exceeded or equalled the average dust condition prevailing underground.

The downcast shafts being of concrete construction, small opportunity was afforded for the collection of dust in the shaft, and while the dust count was increased between the collar and the various underground stations, this was due in a large measure to the transportation of dry material in skips and cars against the downcast ventilation currents.

TABLE I

Konimeter Determinations

Before Salting			After Salting			% Reduction		
*No. Particles per cu. ft. Air			*No. Particles per cu. ft. Air					
Maximum	Minimum	Average	Maximum	Minimum	Average	Max.	Min.	Ave.
22,917,000	3,490,000	7,050,000	7,943,000	2,017,000	3,554,000	65%	42%	50%

* Less than 10 microns in size.

TABLE II

Average Determination, Konimeter Samples

Surface	2,370,000 particles per cu. ft.
Underground stations averaged	2,803,000 particles per cu. ft.

The averages shown in Table II are illustrative.

The difference between the two figures above represents the increase in the intake aid due to shaft travel. The method of salt treatment and the results obtained, previously discussed and shown, indicate that the increase from 2,803,000 particles to 3,554,000 particles per cubic foot represented that due to the ventilation currents. Previous to extensive salting the average as per Table I was 7,050,000 particles per cubic foot which indicates the favorable results obtained in salt conditioning the haulage ways and ventilation courses.

II. *Loading and Transportation of Ore.*

The ore being mined in the Copper Queen Branch is a hard dense sulphide, with a low moisture content. The necessity for heavy blasting in mining produces quantities of finely divided dust which through pulling chutes and dumping at ore pockets caused large amounts of dust to be introduced into the ventilation system. The stoping areas being by nature of the operations the active transportation and main ventilation drifts, this dust was immediately circulated where the most men were affected and where the maximum discomfort would result. To minimize this, water sprays were installed at all chutes and in some instances drop curtains used to localize the area during loading. These measures were only in part successful and as a result the following measures were taken.

(1) Use of an atomizing spray instead of the straight water type. This is installed above the chute and is turned on during all loading operations. Whether the better results obtained by this type is due to the more finely divided moisture particles, a lowering of temperature due to expanding air, or a combination of both has not been determined, but a marked superiority does exist.

(2) The requirement that all men in loading operations at pockets, chutes and skips use approved types of respirators. All shaft pockets are provided with dust sprays and loaders are required to wear respirators at all times. Through the adoption of these measures this dust situation has been greatly improved.

III. *Blasting.*

Of the many blasting operations, that of stope blasting is the operation that is the greatest contributor to the dust problem. Generally speaking the stopes are situated in or near the main ventilation system, the blasting is frequently very heavy, and the nature of the material generally dry. While blasting may be confined to the end of the shift, the resumption of activities both in and around these areas immediately stirs up and puts into circulation the dust which has settled out since the last blasting. To combat this the following steps have been taken.

(1) The areas immediately contiguous to the stope area are at all times thoroughly conditioned with salt. This extends to the manways and lead sets which being always in a dampened condition act as collectors for a part of the dust and prevent its further dispersal. At stope outlets where the upcast currents enter into the level drifts atomizing sprays are placed which are turned on prior to blasting. These effectually reduce the amount of dust and also are very efficient as eliminators of the accompanying smoke and gas.

IV. *Mucking Operations.*

In the Bisbee Mines nearly all mucking is by mechanical means. In drifts and on sill floors, Finlay loaders are used while stope mucking is done by double drum slusher hoists and scrapers. As a protective measure the following procedure is followed:

(1) In both drifting and stope mucking a thorough wetting down of all material is completed before starting mucking.

(2) In stopes atomizing sprays are connected at grizzly discharges before operating slusher. Generally speaking the grizzly discharge will be found to be upcast so that in order to prevent the transportation of dust the sprays are installed.

(3) All Finlay and slusher operators are required to wear approved type respirators at all time during mucking operations.

As a result of these remedial measures a marked reduction in the dust count in the immediate operating areas and the prevention of loading the ventilation currents was achieved.

V. *Drilling Operations.*

Among the early recognized contributing factors to dust contamination was dry drilling, which has been eliminated for many years in the Arizona mines. So many conditions are variable in the drilling operations that while wet drilling has produced a remarkable reduction in the amount of dust, yet an appreciable amount may still be produced. As a result of the tests conducted the solution of this problem seems to be a larger volume of air moving through these areas, which is being accomplished by larger secondary blowers and the carrying of ventilation pipes nearer to the working faces.

This discussion covers the main phases of underground operations and while the opinions offered as to their relative importance might vary yet in many ways they are so inter-allied that the correction of one mutually benefits all others. Thus if the air for ventilation purposes supplied to a working face has an initial high dust content the amount contributed by the immediate operation would need be but small to have the accumulated result approach the maximum allowed. While many operations, such as drilling, are considered most fruitful in dust production at Bisbee, the general circulatory system, affecting as it does all employes, is held to be first in importance.

The mining at Bisbee is at present almost entirely in the so-called limestone ores and the ore is generally of the sulphide type with a low silica content. The limit of 10,000,000 particles per cubic foot was chosen as permissible as it seems to be the lower limit considered in nearly all states. However with the low silica content of the Bisbee limestone ores this could be largely exceeded without in any way approaching the allowable free silica content.

The comparison shown in Table III, which represents samples taken at various intervals at the Campbell mine, represents the average of conditions existing. If the samples be taken as representative, the difference in dust count between the intake and the exhaust air represents the dust contributed by the underground operations.

TABLE III

Campbell Mine	No. Particles per cu. ft.
Average intake air, Collar Shaft	2,016,000
Average Underground Stations	2,747,000
Average Exhaust Areas	3,374,000
Increase due to mining operations	1,358,000
Increase due to mining operations	67%

TABLE IV

Location	Work in progress	Impinger No. particles per cu. ft. air	Konimeter No. particles per cu. ft. air	Ratio Konimeter to Impinger
1,700 stope	Barring down	874,000	2,363,000	2.7
Collar shaft		414,000	1,099,000	2.7
2,200-face drift	Drilling	2,261,000	9,289,000	4.1
" " "	"	3,982,000	7,887,000	2.0
1,700 stope	Slushing	2,495,000	5,562,000	2.2
1,800 "	"	1,874,000	2,997,000	1.6
2,200 "	"	1,507,000	5,050,000	3.4
2,200 blower intake		609,000	4,715,000	7.7
1,700 stope	Slushing	3,295,000	4,322,000	1.3
1,700-113-B stope	Drilling boulders	3,176,000	4,052,000	1.3
1,600 stope	Breaking boulders	4,647,000	8,496,000	1.8
1,700 "	" "	2,924,000	10,875,000	3.7

TABLE V
COMPOSITION OF MINE AIR

Place	Oxygen Max.	Oxygen Min.	Oxygen Ave.	Nitrogen Max.	Nitrogen Min.	Nitrogen Ave.	Carbon dioxide Max.	Carbon dioxide Min.	Carbon dioxide Ave.
Surface	21.00	20.92	20.96	79.04	78.97	79.01	.04	.025	.035
Stopes	20.98	20.26	20.83	79.54	78.95	79.06	.30	.03	.11
Drifts	20.97	20.31	20.82	79.35	78.96	79.05	.45	.04	.13
Raises	20.92	20.53	20.78	79.11	78.98	79.04	.36	.08	.18
Average underground	20.98	20.26	20.82	79.54	78.95	79.05	.45	.03	.13

Methods Used in Dust Sampling

The details of the dust determinations, including the methods of sampling, dust count, dust analysis, and air samples were handled entirely by the engineering department who have covered all phases of the operation very completely and by whom the figures used were compiled.

A brief resume of the methods used follows.

Dust Count

Two methods of determination were used:

(1) The Kotz Konimeter. This method was used for the greater number of samples, because of ease of manipulation and determination. The results obtained were considered as indicative rather than a true count and were so used throughout the work. They were invariably much higher than those obtained by the Impinger method, which is used in standard determinations, and hence the Konimeter results should be considered as comparative. One explanation of this discrepancy is that the Konimeter sample represents an instantaneous sample usually taken at the time of maximum dust count, while the Impinger method represents the average of a 30-minute operation.

(2) Greenburg-Smith Impinger. This method was used as a check against the Konimeter, where operations were not of a short intermittent character. It provided the more reliable information and may be used for collecting dust samples for chemical analysis.

Table IV shows in a striking manner this discrepancy.

Impinger samples at the drilling face were taken at the exposure of the miner.

Dust Analysis

From samples of dust obtained, silica assays were made, which by calculation and checked by the Knopf method determined the percentage of free silica present. In the present Copper Queen Branch mines this is very low so that according to standard codes the dust count could be materially increased without harm.

Air Analysis

In connection with the work performed in dust count and analysis, samples of air from all underground working places were taken at regular intervals. These were in addition to the temperature and humidity readings which have previously been recorded over a long period of time. Standard vacuum bottles were used and regular air analysis made for oxygen, nitrogen and carbon dioxide. Special samples were also run in many instances for carbon monoxide, hydrogen and methane.

As a result of these samples, it was determined that in the active portions of the mine almost normal oxygen and nitrogen content was maintained with a slight increase in the amount of carbon dioxide present. Only negligible amounts of carbon monoxide, hydrogen or methane were ever found and then only in special samples taken in drifts where the ventilation had been purposely shut off after blasting, or in an inactive area adjacent to a fire zone.

The increase in carbon dioxide content in the underground workings was well below the maximum allowable which varies according to authorities between 0.2 percent and 2.0 percent. Contributing to this increase is the carbon dioxide excluded from parts of the limestone and the slow oxidation accompanying certain

(*Concluded on page* 40)

SAFEGUARDING the HEALTH of employes and their families in mining districts*

By WILLIAM ROY, SR.†

IT HAS taken a lot of words to convey the intention and meaning of this paper, as the subject will prove. It covers a private system, established for the welfare of the human race, as opposed to individual effort, but should be of public concern and knowledge.

Systems, for the protection of health and the cure of disease, are most widely discussed questions. Especially is this true with the medical profession and with all employers who unselfishly desire to protect the men who work for them. It is also true that great differences of opinion exist among medical men as to which is the best system.

This paper is intended to give you the facts about a system that has been reasonably successful. It, of course, has its faults. There are some complaints about it and some objections to it. I wish to say now, at the beginning of this paper, these questions, complaints and faults are all caused by the human equation involved and because of the selfishness of individuals.

If the membership would and could see that the laws and rules were meant to advance interests and to benefit the membership as a whole, instead of looking at it as an individual affair, and the medical profession would not try to influence or to be influenced by the individual, our system would work perfectly. I shall try to give you the reasons for the establishment of a medical society, how it was organized, and the results obtained.

Health Facts

Before starting an organization, there must be some discussion with reference to it, and this discussion brings out the reason for same.

In our preliminary discussion of our proposed organization, we had to decide whether such an arrangement would benefit the employes, as well as consider the effect it would have on the company. We arrived at some fundamental facts which we believed were of utmost concern to all, among them being that:

1. Health is the jewel upon which the assets of life are made possible.
2. It is the fundamental basis of happiness and the keystone of satisfaction.
3. It is the security of youth and the sweetness of old age.

These, of course, are only a few facts with reference to health, but they were enough to convince us that the men and their dependents did not enjoy them because of sickness and disease, so we decided something must be done.

Reasons for Medical Society

Under a private arrangement, the doctors did not, in all cases, live at the mines and, in case of an accident, were not always available. With a medical society, they were always on call and the injured received prompt attention. The doctor's office could be situated right at the mine and every minor scratch and injury attended.

We found many men going to work who should have been under treatment. We found much sickness in the families that was not receiving proper attention and this added to the worries of the employe, making him more susceptible to accident.

We found hundreds of children who needed medical care who never would receive proper attention through the individual care of their parents.

All of these things tended to reduce the morale of the men and surely did not add to the peace and satisfaction that should prevail in all mining towns.

How It Was Organized

The first step was to call a meeting of all the men at each mine. This included all monthly men, as well as the workers who were members of the union. The proposition was put to them for vote and, after being accepted, steps were taken to conclude the arrangements. Committees were appointed to draft by-laws, discuss the question with local and state medical societies, and such other work as was required. After the by-laws were drafted to the satisfaction of the committee, they were presented to the men as a whole for acceptance. If accepted, they were printed, distributed, and put into effect.

Rules of the Society

The rules provide that all persons working for the company, and their dependents, are beneficiaries.

Any person living with, and dependent upon, a member receives the same benefits as the member, except in case of death, which is based upon age or relationship to member.

The by-laws apply at all mines, yet each mine is a unit and not responsible to the other.

The by-laws cannot be changed, except upon the vote of all units.

A committee, consisting of six, controls the affairs of each unit. The safety director, one member appointed by the general manager and four members elected by the entire membership, comprise this committee. They have the power to appoint the chairman, vice chairman, secretary, and treasurer, but only the committee has the right to vote.

This committee meets once each month and all bills contracted during the month must be passed on by this committee before they are paid.

The committee hires the doctor, but the selection must be satisfactory to, and approved by, the general manager of the company.

In all other cases, the committee's vote is final, provided, however, it cannot violate the by-laws.

The fund is raised by check-off, married men and single men paying a stipulated amount each month.

The company furnishes an emergency hospital at each mine. It contributes the safety director's time in checking all bills, securing agreements with surgeons, specialists, and hospitals, and looking after the general welfare of the membership. It also contributes to the association in case of death of a member or dependent.

The association doctors receive 45 per cent of the total amount of the check-off from their unit and, for this amount, attend to all medical cases, perform all minor operations, and furnish such med-

* Presented to National Safety Council, October, 1935.

† Safety Director, Hanna Coal Co. of Ohio, St. Clairsville, Ohio.

icine as is needed. The other 55 per cent stays in the treasury to be used in special cases; such as operations, hospitals, etc., also to pay death benefits.

All members must use the association doctor, except in case of emergency. They have, however, the right to select the hospital and surgeon, if such is necessary.

Cases existing at time of employment are not cared for, and liability ceases at time the member leaves employment of the company.

All other details are covered by the by-laws and a strict compliance with same covers a multitude of cases and works out in a successful way, as the following will show.

Results of the Association

The association has been in effect a number of years, but I shall give you the income and volume of business transacted in 1934. During that year, we had approximately 2,500 members who, in addition to a large number of dependents, benefited by the arrangement.

The expense for medicine, in the following figures, was for special serums, antitoxins, or medicine used in hospitals, and does not include the medicine used by the association doctors in their regular practice.

In giving the number of hospital cases, it refers to only those that were sent to outside hospitals.

Many operations were performed in our own emergency hospitals and some special cases were treated at the office of specialists.

The death rate per thousand persons involved is only about 50 per cent of the rate in the state of Ohio.

Association doctors treated their patients 41,242 times. There were 294 hospital cases and 45 deaths. There were 238 men, 245 women, and 395 children, who received special treatment or operations.

Some of the more important special cases or operations treated or performed, during 1934, included the following:

Hemorrhoidectomy	Goitre
Tonsillectomy	Osteomyelitis
Circumcision	Herniotomy
Eye, Ear, Nose and Throat Cases	Metabolism Test
Antitoxins and Serums	Mastoidectomy
Blood Transfusions	Fractures
X-Ray and Fluoroscopic Examinations	Sinus Trouble
Pleuropneumonia	Cystostomy
Appendectomy	Tuberculosis
Paralysis	Intestinal Troubles
Cardiogram Examinations	Loss of Speech
Tumors	Kidney Operation
Laparotomy	D & C
Varicose Veins	Insulin Treatment
Toxemia	Infections
	Malnutrition
	Special Baby Cases

I think you will agree with me when I say, from a health viewpoint, we had a successful year.

Any medical arrangement can be a success if all parties cooperate, and if it is conscientiously supervised and honestly administered.

It will send hundreds of boys and girls into the world glowing with health. It will ease the pain and suffering and cure the ills of men and women.

INCOME FOR 1934		$56,201.09
EXPENSES:		
Hospital Wards	$ 5,683.45	
Operating Room	1,386.25	
Anesthetic	622.00	
Medicine	686.23	
X-rays	2,048.40	
Laboratory Fees	401.76	
Dressings	155.23	
Death Benefits	5,115.00	
Ambulance	239.00	
Specialist or Surgeon	13,643.86	
Committee expense	58.36	
Miscellaneous	615.56	
Association Doctors' Salaries	23,147.78	
		$53,802.88

A cooperative medical association comes like a miracle into the lives of the masses, and sends the individual out with a smile on his face, which otherwise might be distorted by some nerve-racking disease.

The Employer, Employe Relationship

(*Continued from page* 20)

The spectre in every worker's household is the fear of shut-down or lay-off. The employer, in his fight for markets and low costs, is taking practical steps to win for the worker some measure of security against unemployment. Let any government afford to industry the one encouragement which it requires, some tolerable security that it shall enjoy the fruits of its own labor, and it will have gone far in bringing about that social security so desirable to all.

In his efforts to make his plan a safe place, in which men may work without danger to life or limb, the employer is actuated by both human and gainful interests. The achievements in this worthy endeavor have been truly magnificent, and, as usual, the benefits therefrom are shared alike by employer and employe. The safety movement is only one of a long list of related activities in the direction of health improvement, education, pension and savings plans, vocational training, home purchase plans, group insurance, definite lay-off procedures, legal aid, cooperative purchasing, profit sharing, stock purchase plans and scores of other mutually beneficial undertakings to be found quite generally today in American industries. Without paternalism, without trace of feudalism, but in a truly cooperative spirit, employer and employe have joined in such activities as these for their common good.

There is scarcely need to mention the human relationship between employer and employe. That mutual respect of one for the other can exist only between beings emotionally similar. Each cherishes this human bond. Often it alone governs their relationship. Each knows, equally and well, the penalty for the violation of that law. As expressed in the words of Ralph Waldo Emerson:

"All infractions of love and equity in our social relations are speedily punished. They are punished by fear. Whilst I stand in simple relations to my fellow man, I have no concern in meeting him. We meet as water meets water, or as two currents of air mix, with perfect diffusion and interpenetration of nature. But as soon as there is any departure from simplicity and attempt at halfness, or good for me that is no good for him, my neighbor feels the wrong; he shrinks from me as far as I have shrunk from him; his eyes no longer seek mine; there is war between us; there is hate in him and fear in me."

This covers briefly and superficially some of these fundamental principles which govern in the employer-employe relationship. In the picture of American industry, there are strikes, bitter disagreements, chisellers large and chisellers small. But make no mistake: to have attained its tremendous growth industry must have had at its roots cooperation, mutuality of respect and community of interest between employer and employe. The welfare of one is inextricably bound up in the welfare of the other. On the skill, resourcefulness and character of the American workman, the industrial leader stakes his hope; in the industrial leader, the American workman has found his sincerest and ablest ally, his protagonist in the struggle for social security and that fuller, richer life.

PRINTED copies are now available of the report of the National Resources Board on "State Planning—A Review of Activities and Progress." This is a 310-page volume, and is for sale by the Superintendent of Documents, Washington, D. C., at 75c a copy.

Difficult Heading Driving *and* Pumping Problems*

By F. C. CAROTHERS †

IT IS not my intentions to repeat the information contained in the June issue of the *Coal Age*. However, this large scale map will need some explanations.

In driving headings adjacent to or towards creeks we found that invariably water encountered came over the top of the coal and through a layer of soft shale about an inch thick. Usually the heaviest flows came down stream with reference to outside water. Previous experience also led us to expect a large amount of gas with the water. These past experiences had much to do with placing of drill holes for grouting and also for plans in advancing the headings.

The thirteen holes drilled were as near as possible on center lines of projected headings and above or up river from them. The holes on the county roadside were the ones that consumed the most cement grout while on the railroad side the two holes took only 60 bags of cement. Two of the holes were drilled and grouted after the headings had progressed to within a few feet of the county road. There was a noticeable slowing up of drip and one roof leak stopped as the grout was forced in these holes.

The hole in the breakthru on the headings to the bore hole was found to have grouted a vertical crack in roof about 40 feet from the hole. The grout could be traced through the draw slate and into the crack. This crack, judged from its direction, was the one making water in No. 6 heading.

Numerous indications of cement grout were found as the headings progressed under the river. We found the best conditions immediately under the river; that is, in regard to roof, roof leaks and water from the coal. The proof of the actual value of the grouting can be shown except in the two or three roof cracks that were filled, but from past experience, we found remarkably little water in the draw slate and on top of the coal.

The crumbling, soapy appearance of some of the draw slate encountered leads us to believe that the grout under high pressure had not only blocked off the water but had broken down the structure of the soft slate.

The saying of old miners and bosses that "the roof is always best immediately under the stream" seemed to have been proven out.

The six headings were turned to drive under Dry Fork at a point where outside surveys showed a narrows or where outcropping rock strata came near the creek on opposite sides.

These headings drove on a very slight dip towards the river and the water encountered was pumped by the usual reciprocating mine pump about 2,000 feet to a drainage ditch through which it flowed to the sump of a pump station and was pumped through a bore hole to the outside.

The original intention was to drive the two headings at right angles to the bore hole for pumping and power. However, elevations when the hole was drilled and of the adjacent headings, dictated moving back for sump purposes. Also considerable flow of water was encountered in the No. 6 heading at about the point from which sump headings were projected.

When we encountered water, mostly drip, in most of the six headings, work was stopped on them and the two bore hole headings rushed. A 500 G. P. M. centrifugal pump was installed and only just in time due to some water encountered driving the bore hole headings out.

Headings Nos. 1, 3, 5, and 6 were not driven as far as projected due to encountering heavy roof accompanied by water. I might add that this condition occurred at a point well back under outcroppings, cliffs and not under the river valley.

When the last breakthru between the headings Nos. 2 and 4 was completed a Jeffrey blower was installed with a "Y" and one line of tubing into each heading. This blower was powered through armoured cable by 440 volt current. A tight brattice line of pine shiplap was carried in each entry. The tubing, pipe lines, power lines and pumps were all kept on the intake side of this brattice line.

The profile of the headings shows that the progress was up-hill and then suddenly dipped. Some water was encountered from the roof through small roof cracks but, on an upgrade, was little handicap. About 25 feet from the crest of the hill, down grade, we encountered a heavy flow of gas and water from the bottom while machine was cutting. The first blower blew for 15 hours, the water increasing as gas flow increased.

From our first experience we found that reciprocating pumps were almost useless when the water was heavily charged with slack coal. Open type impeller, Deming Mueller, centrifugal pumps, designed for low head and large volume, were resorted to, to handle the bulk of the water while LaBour self-priming pumps were used in the faces.

A suction box 2 feet square, 8 inches high and covered with ¼-inch mesh hardware cloth was made. Through a hole in one side, the suction hose of the centrifugal pump was brought in and a turtle back strainer placed on the end of it. By regulating the discharge and cleaning the hardware cloth cover periodically, the centrifugal pumps seldom went on air. With abundant water an easy method of priming was worked out.

With all of these it was found almost impossible to keep the water down when the short wall machine was cutting. After drowning out on the first blower, the machine was unloaded for the next cut, onto a cribbing of ties and car bottoms, and the cut made 18 inches off the bottom. The next cut was made off this bench and thereafter a cut of bottom was carried and only taken up when another cut was loaded out on top of the bench. By this method the suction box could be placed near and below the bench and by keeping the machine cutting on the bench the pump could be kept running.

With both type of pumps three and four-inch pipe was used. This reduced friction head to practically nothing and while heavier to move it was easier to couple up and never mashed up. Dresser couplings were used extensively and were found to facilitate laying or changing of lines.

After headings had advanced a few feet beyond the heavy flows from the bottom a small sump was shot out

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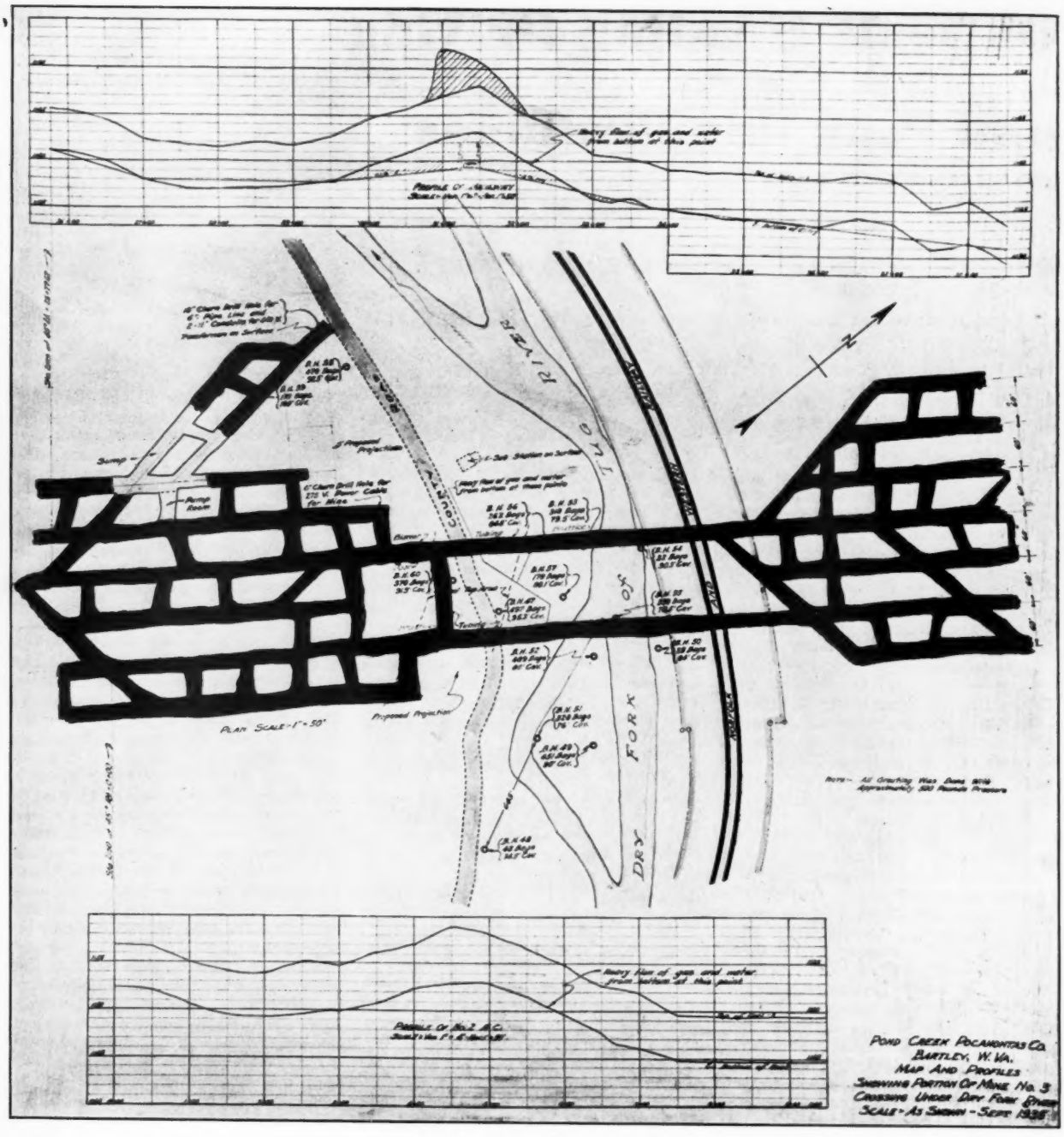
* Presented to the West Virginia Mining Institute, October, 1935.

† General Superintendent, Pond Creek Pocahontas Company, Bartley, W. Va.



just below and a centrifugal pump installed close to the sump. With a three-inch pipe suction and combination strainer and check valve and the discharge being up grade, the pumps were self-priming. After a few trials the valves in the discharge could be regulated until the pumps just handled the flow. We changed the drive on these pumps from 250 D. C. to 440 A. C. thus eliminating power failures. The 440 volt power was carried to the pumps through an armoured cable. Switches were installed at pumps and a control switch near the fan.

Overhead leaks were kept off the roadway by using corrugated sheet metal placed over headers. Old rubber covered conveyor belting was also found useful for this purpose and on two occasions where gas blowers came from the roof an opening was made in the top of the wood brattice line and a trough of the old belting used to keep a flow of air diluting the gas.

The brattice line of shiplap was certainly an added safety factor. The blower produced plenty of air for the working faces but on two occasions when the blower was down for repairs the air passing behind the brattice line made it possible to keep pumps going which were also behind the line. The added volume of air entering the face from behind the brattice served to further dilute the mixture and made it possible to safely operate open type cable reel motors. The No. 4 heading having advanced to its objective first was ventilated by the brattice line and the blower air concentrated in No. 2.

The greatest amount of water from overhead was encountered just prior to entering the near side of the valley.

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The Significance of Silicosis in Mining

(*Continued from page* 22)

hazard to within safe limits or applying adequate protective devices. A constant check of the dust concentration in the mine air should be maintained, and records should be kept to show the condition of the working atmosphere, the nature of the protective equipment in use, and the total amount of time each miner is required to spend in a hazardous occupation. The author has previously discussed good practice in combatting dusts produced by mining operations, and this information is available in Technical Publication No. 638 of The American Institute of Mining and Metallurgical Engineers.

Pre-employment examinations including an occupational history and excellent stereoscopic chest roentgenograms should be given each new employe. In general these examinations will serve to classify men into three main groups composed of those whose chests are apparently normal, those who have an occupational fibrosis without any other pulmonary abnormality and those who have tuberculosis or other pulmonary abnormalities either with or without occupational fibrosis. In considering the desirability of employing men whose chests are apparently normal, it should be emphasized that young men up to the age of 30 or thereabout are not altogether perfect risks for employment in a hazardous dust since they are in an age period during which they may still c o n t r a c t tuberculosis. In the speaker's opinion, men who show evidence of simple occupational fibrosis or silicosis and who are past the age of 30, as most of them will be, are excellent risks for employment, since ordinarily uncomplicated silicosis is not regarded as disabling, and since these men are past the age period during which they are likely to develop tuberculosis. Miners in this group may show some progression of their fibrosis after continued employment, but they will not tend to develop disability if they have been rigidly examined to exclude those showing any x-ray evidence of tuberculosis or other pulmonary injury.

If this class of persons is discriminated against it creates a most unfortunate social problem, since many skilled miners perfectly capable of a lifetime of useful activity are thrown out of work to become embittered and the prey of unscrupulous lawyers and doctors who further complicate the situation by making claimants and neurotics of valuable workmen. These individuals should not be eligible for compensation, but if they are made so under the law, then legislation should also be provided to permit them to waive their right to compensation for an occupational disease, so that they may have the privilege of working at the task for which they are best suited. Providing this group is carefully selected to exclude infection, and is kept under medical supervision while in the mining industry, their experience should be as favorable as any group that could be chosen. As to the third group of men, an injustice is done both to the employer and to the prospective employe in placing at work in a hazardous dust any person who has tuberculosis or other significant pulmonary abnormality, whether or not occupational fibrosis or silicosis is present.

In the presence of a known dust hazard old employes should be placed, so far as possible, in those occupations most compatible with their health and welfare on the basis of the physical examinations which they have undergone. Men with normal chests who are past the age of 30, or those with silicosis may be employed at any occupation where the dust concentration is within the limits dictated by reasonable control; while young men under 30 should not be exposed in those operations which produce the most harmful dust and should be re-examined fairly frequently. Those cases of inactive tuberculosis, either with or without silicosis, should be carefully evaluated and every effort made to select for them occupations such that their health will not be impaired or their ability to earn a living wage interfered with. Men in this group should also be re-examined at frequent intervals. Cases of active tuberculosis should not be employed in a dangerous dust either for their own safety or that of their fellow workmen, and should be encouraged to enter a sanatorium or to place themselves under the care of a competent physician.

The occupational disease problem is similar to that presented by industrial accidents when the first compensation acts were passed. Disabling conditions created or aggravated by exposure to harmful dust produced in mining operations can be prevented or controlled. The success of any plan designed to accomplish these purposes will depend upon maintaining a broad educational program similar to that adopted in the "Safety First" movement. These policies are not only humanitarian, but they are practical and have been placed in operation in mining districts employing thousands of men. May I sincerely recommend them for your consideration?

The Safety Factor In Mining

(*Continued from page* 30)

of its results the increase in human happiness. To those of you who have been interested in this movement I offer my congratulations. To those of you who have not, I urge you to join with us in this program so that in the future we will not be told that our industry is the most dangerous to life and limb of any industry in this country. Accidents are a shameful waste and should not be tolerated.

The Fallacy of Higher Wages, Shorter Hours and Increased Taxation

(*Continued from page* 17)

$13,000 he estimated that about $7,000 is being added to the national debt, to be paid by future generations.

It is estimated that between now and July 1, 1936, a total of $3,892,000,000 will be spent by the Federal Government over and above its income.

The gross national debt on July 31, 1935, amounted to $29,120,000,000. The total gross debt of all divisions of government, Federal, state and local, is about $47,000,000,000, or $375 per capita. In 1913 it was $33,000,000,000.

In 1932 the cost of state and local governments had increased 102 percent over 1922. The state and local expenditures for 1932 were $8,704,000,000, or $69.73 per capita. This, added to the $64.55 for the Federal Government, makes a total of $134.28 annual taxes for every man, woman and child in this country.

Complaining about governmental extravagance and inefficiency and joining organizations—sometimes even rackets—whose avowed purpose is to fight tax increases, gets us nowhere.

So long as we are content to give our proxy to "George" to act for us in performing our duties as citizens, we cannot expect much relief from existing tax burdens.

I am not a prophet, yet I venture to predict that recovery will not come by the shortening of hours, increasing wages or higher taxes. Prosperity will come when there is some indication that our national budget will be balanced and that we have quit tinkering with the dollar; when there are manifestations of determined efforts to greatly reduce the cost of government, Federal, state and local; when there is a reduction in unemployment by the starting of the wheels of industry, especially in the manufacture of durable goods.

The International Tax Problem

(*Continued from page* 14)

not recognize capital gains as tax income. The Hollander can see no obligation to pay a tax on a nominal dollar profit when the actual result to him in florins is a loss, due to our revaluation of our money. We also have difficulty in trying to collect taxes on profits of foreigners on their hedging transactions on our produce exchanges, without recognition by us of their concurrent losses.

Technically our department may be right under our laws, but I doubt if it can obtain any material amount of taxes from such transactions, because avoidance or evasion is too easy. It seems to me it would be better by law, treaty, or regulations, to recognize this, than to drive the business from our country to our detriment.

Developing Safety In Metal Mines In the United States

(*Continued from page* 28)

are very few underground mines in the United States, metal or coal, which haven't very definite fire hazards. Practically all metal mines used "powder," fuse, timber, and other combustibles; nearly all use open lights; practically all allow smoking; and many use electricity for pumping or ventilation or loading or haulage or other purposes. Hence metal mines almost universally have the very dangerous combination of combustible material and igniting agencies and it should be remembered that a very little burning timber or burning explosive can readily produce enough poisonous or asphyxiating gases to kill hundreds of persons. Every metal mine operator should recognize the hazard of fire—either in the mine itself or in the flimsy timber surface structures found very generally at or near the mine opening; and every mine should have a fire-prevention and fire-fighting plan. This subject is far too extensive to discuss it in detail here but much information about metal mine fires may be secured by those interested in the subject.

11. The ever-increasing use of electricity in mining introduces many new and serious hazards especially with reference to initiation of fires and to dangerous accidents from contacts with charged electrical equipment of various kinds. Utmost care should be taken in the purchase, installation, use, and maintenance of all electrical equipment or devices in or around mines. There should be a rigid inspection and written report by a competent electrician at least as often as once every month as to the safety of all electrical wiring, machinery, etc., in or around every mine, and prompt action should be taken to keep such installations in safe condition at all times.

12. Explosives accidents continue to occur far too frequently in metal mines. Hence the greatest care should be taken in the choice of explosives used and in the storage, transportation, charging, and firing of them. None but the safest types of explosives and explosives appurtenances should be used. In general, electrical blasting is much safer than blasting with fuse, but electrical blasting is by no means "*foolproof*." If at all feasible, blasting should be done only at the end of the shift, or possibly by shotfirers after the general shift has left the mine; this is important from the viewpoint of both health and safety as blasting throws into the air enormous clouds of gases and dust the breathing of which is likely to be dangerous.

13. Many mining companies are now making remarkable progress in accident prevention through use of protective clothing such as hard hats, various kinds of hard-toed shoes and other foot and leg protection, goggles, safety belts, etc. In many cases difficulty has been encountered in securing the cooperation of the workers but usually this can be overcome if the mine officials themselves will pave the way by using the recommended materials consistently. In some cases it has been found necessary to require the use of the protective clothing but where good judgment is utilized compulsion should not be necessary except possibly with a relatively few persons.

14. A few metal mines in the United States and several in Canada are now supplying up-to-date electric cap lamps for the mine workers. This should be done in all metal mines because electric cap lamps when handled efficiently give the underground worker better and more dependable light than can be obtained otherwise and the worker is better able to see what he is trying to do and what hazards surround or menace him. In addition the mine is partially freed from the hazard of mine fires (one of the worst menaces confronting the underground worker) for, although open lights have started numerous fires in metal mines, so far as known no electric cap lamp has ever started a fire in any kind of mine, coal or metal.

15. Mining companies should take heed to the menace of dust disease. In view of the present-day uncertainties as to the types or analyses or sizes or quantities of dust which may be harmful, common sense demands that to "play safe" the far-seeing mining man should employ all feasible means to reduce air dustiness. The best known present-day methods of doing this are to use only wet drilling, including collaring of holes; to do no blasting with the shift in the mine; to have water blasts available at or near all places where blasting is done so as to allow possibly dusty places to be thoroughly wetted before and after blasting; to wet muck piles after blasting and while loading; to wet down chute mouths or other dusty places or to remove dust or dilute air dustiness in some other way; to have ample ventilation both to remove blasting fumes, gases, and dusts with minimum delay and, as far as feasible, to supply fresh, cool, moving air at places where men work; to supply up-to-date respirators and require their use by persons who must work in places from which air dustiness cannot be reduced to a reasonable amount. In other words, "kill the dust" should be the slogan of the wide-awake far-seeing mining man.

16. Employers haven't the control over employes now that they have had in the past and many mining men point out that suggestions of the type contained in this paper cannot be put into effect or kept in effect. While it may be true that the employer's task in introducing and forwarding safety may at least temporarily be much more difficult than in the past, nevertheless, the workers probably will not offer any considerable amount of continued opposition if sincere tactful efforts are used in placing effective, common-sense safety rules, practices, methods and devices in effect in our metal mines.

17. Consistency on the part of the mining companies demands that they first "*put their own house in order*" before asking or requiring the employes to alter the old for the newer and safer practices. This means that mines should be well ventilated, preferably by mechanical control; that well-constructed cages or man cars be supplied to transport the men into or out of the mine; that all mines have more than one exit and that all exits have well-placed and well-constructed fire doors for use in case of necessity; that all cages have practicable and workable doors, used at all times when men are aboard; that all openings to shafts, winzes, raises, or steep inclines have adequate doors or other device to prevent men or material from falling into them; that ladderways, shafts, raises, or winzes over 70 degrees pitch have platforms at least every 30 feet and that ladders and ladderways be kept clean and in good repair; that all machinery be kept adequately guarded; that timber supply be ample, of correct size, length, etc., and placed reasonably close to the point of use, etc. And finally, all officials should certainly observe and obey the rules and regulations scrupulously at all times.

Methods of Underground Dust Control

(*Continued from page* 34)

strata, of which carbon dioxide is one product.

Summation

The conclusion may be drawn that by proper attention to all operating details and guided by the results of properly conducted determinations, a marked improvement in underground dust conditions may be made. This work should start at the collar of the shaft and follow through the different mining processes. At this time the necessity of "good housekeeping" throughout the mine should be emphasized. In mines where humidities of 80 percent or higher prevail the use of sodium chloride without addition of water, as a means of dust control, is recommended. In mines which have the lower humidities its frequent use in solution would be necessary.

These measures, together with ample and properly controlled ventilation, occupational use of approved respirators and extensive installations of sprays at Bisbee have resulted in a distinct betterment of mine conditions.

THE Stephens Coal Company, of Wilkes-Barre, Pa., recently presented an interesting three-reel motion picture of the actual operation of coal thieves. The film was shown before members and guests of the Coal Trade, at the Manufacturers Club, New York City.

PERSONALS

J. D. A. Morrow, president of the Pittsburgh Coal Company, has returned to Pittsburgh after an inspection trip to the company's coal receiving docks at Duluth, Minn. **A. N. Scaife**, chairman of the board of directors of the company, accompanied Mr. Morrow on the trip.

Homer D. Williams, president, Pittsburgh Steel Co., has announced his retirement, effective February 1. Mr. Williams is 72 years of age and a veteran steel man. He was formerly president of the Carnegie Steel Company.

Emmett S. Pugh has been elected to the presidency of the Raleigh Smokeless Fuel Company, Beckley, W. Va. He is also president and general manager of the Raven Red Ash Coal Company, Raven, Virginia.

Eugene H. Merrill, of the engineering staff of the U. S. Smelting Refining and Mining Co., Salt Lake City, Utah, has been appointed chief engineer of the Utah State Public Service Commission.

Alex McKay has been elected president of the Quilp Mining Company, with interests near Republic, Wash.

Frank L. Sizer, consulting engineer, San Francisco, Calif., has returned from his recent trip to Europe.

Frederick C. Gilbert, Butte, Mont., has been retained by a group operating the Drake mine near Dixon, Mont., to work on the problem of the concentration and separation of the values contained in the ore. Plans at the Drake mine call for extensive development operations, as well as research work on the problem of reduction and recovery.

Pitt W. Hyde, Grass Valley, Calif., recently sailed for Korea to assume charge of exploration operations for the Oriental Consolidated Gold Mining Company.

Oscar A. Glaeser, formerly safety engineer for the California State Compensation Insurance Fund, has been appointed to the staff of the U. S. Bureau of Mines in Pittsburgh, Pa.

J. Homer Patten has been appointed executive assistant to President C. J. Hardie, American Car and Foundry Company. Mr. Patten was formerly associated with the Westinghouse Electric & Manufacturing Company.

D. R. **Swem**, Northwestern Improvement Company; **Ralph Weir**, Oglebay Norton & Company, and **Howard N. Eavenson**, of Eavenson & Alford, Pittsburgh, were among the recent visitors to the Washington office of The American Mining Congress.

H. H. **Taylor**, former president of the Franklin County Coal Company, is spending the winter in Texas and Arizona.

John Gilbert, president of Madeira Hill & Company, has returned to Philadelphia after a two months' visit at the ranch of his son, John Gilbert, Jr., at Bozeman, Montana.

Herbert Wilson Smith, Union Carbide and Carbon Corporation, recently presented a silver cup to the Alpha Phi Chapter of Phi Gamma Delta Fraternity, at the University of Michigan, to be awarded to the most outstanding freshman each year. Mr. Smith is a distinguished graduate of the University of Michigan and has long been interested in the activities of his fraternity. The cup was presented to the dinner commemorating the 50th anniversary of the chapter, and its inscription is from the Rubyiat—"Think, then, you are today what yesterday you were; tomorrow you shall not be less."

E. T. **Stannard**, president, Kennecott Copper Corporation, sailed from New York on November 8 on a trip to Chile to inspect the Braden Copper mine.

Norman G. Thompson has been appointed superintendent of the Black Pine Silver Mines, Inc., operating near Philipsburg, Mont.

John Coolbaugh is now with the American Cyanamid Company as metallurgist at its ore-dressing laboratory at Warners, Linden, N. J.

Downie D. Muir, Jr., is now president of the United States Fuel Company of Utah.

T. J. **Thomas**, president of the Valier Coal Company, was recently elected president of the Illinois Mining Institute at its 43rd annual meeting. **W. J. Jenkins**, Consolidated Coal Company of St. Louis, was elected vice president, **B. E. Schonthal**, was reelected secretary and treasurer.

Judge E. A. Colburn, pioneer Colorado mining man, is confined to a Denver hospital, suffering from injuries which resulted from a recent fall.

J. W. Porter has been elected president of the Alabama By-Products Corporation.

William Carlton Read, for 25 years associated in an official capacity with metallurgical research and development activities of units of the Union Carbide and Carbon Corporation, died suddenly on November 6 at his home in New Rochelle, N. Y. Mr. Read, who was 47 years old, was a prominent metallurgist and had been intimately connected with many of the major research developments in the production and utilization of ferro-alloys and alloying metals.

Keith J. Evans has been appointed manager of sales promotion, Inland Steel Company. Mr. Evans held a similar position with Joseph T. Ryerson & Sons, Inc., which has now become a subsidiary of the Inland Steel Company.

Lawrence Fox, Salt Lake City, Utah, has been elected president of the Park Utah Consolidated Mines Company, to succeed the late George W. Lambourne. **Oscar N. Friendly** was elected vice president and general manager of the Park Utah, also president and general manager of the three other Lambourne companies—Park City Utah Mines Co., Ontario Silver Mining Co., and Daly mining Company. **J. William Stoner** was elected secretary-treasurer of the Park Utah Consolidated Mines Co.

C. J. Sandoe, of the Perry Coal Company and **D. W. Beggs**, Macon County Coal Company, both from the Illinois coal fields, were in Washington during the month on matters relating to the price fixing policy of the Bituminous Coal Commission.

Under the recent reorganization of the Consolidation Coal Company the following officers were elected: **Robert C. Hill**, president and chairman of the Board of Directors; **J. Noble Snider**, vice president; **H. H. Snoderly**, vice president in charge of corporate affairs; and **G. W. Kratz**, comptroller. A Board of Directors of 10 were also elected.

The Harlan County Coal Operators Association elected the following officers for 1936 at the annual meeting of the Association on November 20: **S. J. Dickenson**, president; **Chas. S. Guthrie**, vice president; **Geo. S. Ward**, secretary; and an executive board composed of **E. J. Asbury, Pearl Bassham, C. B. Burchfield, D. B. Cornett, R. W. Creech, W. A. Ellison, Elmer D. Hall, L. P. Johnson, J. C. Stras, R. C. Tway**, and **A. F. Whitfield, Jr.**

Wheels of Government

(*Continued from page* 23)

is current concerning the basis for the factual surveys being made under the Security Act, which it is contended, show significant misconceptions of the aim of the program.

The tax reduction programs of large groups of industry are receiving considerable attention.

Astounding figures showing the extent of governmental expenditures, local, state and national, were presented by the National Business Conference Committee on October 31st. They indicate that these total expenditures in 1913 were approximately four billion dollars. In 1929 they had raised to 10 billion dollars, and at the end of 1934 they had reached 15 billion dollars, which is equal to one-third of the total national income from all sources. According to political observers, the demand for the cash payment of the bonus and the possible invalidation of processing taxes, are continuously adding fear to the thought that instead of a decrease in taxation it will be necessary to materially increase taxes to meet these needs.

The action of the Supreme Court will have some effect upon the tax program. Administration officials have declared that they are anxious to avoid new taxes, but there is reason to believe that the legislation which is pending will be thoroughly aired. This includes a proposal to remove tax exemption from Federal securities, but as this involves a Congressional Amendment, action is not anticipated. Inheritance Taxes will get prominence if the whole subject ot tax is opened up; and others which may or may not be considered are Estate and Gift Taxes; Processing Taxes, Tax on Bigness; Intercorporate Dividends.

The Canadian Treaty was another highlight of the month and is of very great interest to all industry, and its special application to mining is found elsewhere here in this issue.

These then represent the major issues that have had consideration during the past month. The general atmosphere is easing in its tension as industry becomes more absorbed in producing and less annoyed by Government's interference. It is understood that President Roosevelt's breathing spell for business will last possibly many months, although no one can successfully predict what the second session of the 74th Congress will determine is desirable. Congressional committees now have under way some 22 major investigations upon which they are to report, many of which are to be the basis for legislative action. We are certain to have major efforts to saddle industry with the 30-hour week and many proposals looking to social reform.

Coal has continued in its role of the "example industry" and coal men have spent much time sitting on the doorstep of the administration in either the attitude of petition or defense. The National Bituminous Coal Commission has been busy setting up its operating personnel, in holding meetings for the consideration of various phases of the industry's problems and in promulgating rules and regulations under which the Commission is to function. In the meantime, suits in the state courts are attacking the validity of the act, and Alabama, West Virginia, Kentucky, Pennsylvania all now have test cases before their courts. The first case to be considered was the Carter Coal Company, which brought suit to halt the collection of the 15 percent tax imposed by the act. The decision of the District of Columbia Court in which it refused to halt the collection of the tax, but sustained the request for an injunction to bar it from subscribing to the code, is a highly important feature. The long expected decision in the Tway Coal Company's test case upheld the constitutionality of the act. Meanwhile the possibility of an early Supreme Court determination of the issue seemed unlikely. The Bituminous Coal Commission has been studying the whole situation and the recent ruling made by the Procurement Division of the Treasury Department regarding purchases of noncode produced bituminous coal may have a very serious effect, some contending that it will apply to the railroads' purchase of fuel because of their United States mail contracts.

THE National Coal Association through J. P. Williams, Jr., president, has refused the invitation of the Coordinator for Industrial Cooperation to attend the December 9 conference, pointing out that "The bituminous coal industry will have no occasion to be represented at such a conference inasmuch as it is now generally working under a labor contract which extends until 1937, and further that it is also beginning to operate under the Bituminous Coal Conservation Act and has been to that extent removed from a category that might seem to make it desirable to participate in a general council to consider labor and other subjects."

THE Island Creek Coal Company and its affiliated companies on November 12 and 13 held a general sales meeting at the Gibson Hotel in Cincinnati, which was attended by some seventy members of the sales force. J. D. Francis, president of the company, was the main speaker at the dinner where he discussed coal preparation and the Guffey Act.

THE National Association of Manufacturers in its report on relationship between industry and Government opposes (1) the 30-hour week in industry; (2) the setting up of a little NRA for industry; (3) the Wagner Labor Disputes Act; (4) business competition with private enterprise; (5) the principles of the "Share-the-wealth" taxation; (6) Government use of extra legal methods to enforce federal regulations by prohibiting use of mail; (7) the Guffey Coal Act; (8) proper study of the application of the Social Security Act until its provisions may be studied and applied impartially and intelligently.

A CENSUS Business for 1935 is to be launched from Philadelphia on January 2. It is designed to provide complete and basic data for the extensive field of business. Fields to be covered by this census include retail trade, hotels, insurance, real estate, construction, banking and finance, business services, broadcasting, advertising agencies, wholesale trade, amusements, distribution of manufacturers' sales, trucking and warehousing and transportation.

BITUMINOUS coal production in the United States for the week ended November 23 was approximately 8,000,000 net tons. The report of the Bureau of Mines shows production of 7,838,000 tons for the week ended November 9, and 7,674,000 for the week ended November 16, 1935.

Production calendar year to November, 1935—324,910,000 tons; 1934—320,472,000 tons.

Book Review

HANDBOOK FOR PROSPECTORS, by M. W. von Bernewitz. Third edition, 372 pages, 104 illustrations. McGraw-Hill Book Company, New York, 1935. Price, $3.

APPARENTLY, it speaks well for this flexible, pocket-size book when it has had three editions and one extra printing of the first edition and two extra printings of the second edition, since its first appearance in 1926.

This one covers the whole field of minerals—metallic and non-metallic separately—from A to Z—aluminum to zirconium and abrasives to talc. In recent years, several books have been published on gold and silver only; but these metals receive ample space in this third edition. A useful glossary of mining terms is included; and because all of the minerals are described alphabetically, the index, while sufficient, is not in great detail.

As an example of the information given, under *Lead* we find a few lines on this metal, then extended reference to its occurrence, three tests for it, and enough concerning the lead minerals. Under *Mica* we find the characteristics of this mineral, how it occurs, what grade is marketable, and its utilization. The uncommon metals, gemstones, building stones, and sand and gravel have suggestive mention, normally, these not being sought by the prospector, yet they are worth attention.

More than a third of this book gives practical suggestions on grubstaking, outfitting and transportation, United States and foreign laws, mineralogy and blow-pipe tests, elementary geology, where and what to search, the importance of sampling and marketing, simple surveying and mapping, and developing and equipping a prospect to the selling stage, including smelting and ore treatment.

Prospecting in the United States, Canada, Australia, and Netherlands Indies is the scope of this work which has been prepared for the prospector, miner, student, and engineer.

MINING EVENTS

THE 14th annual convention of the Idaho Mining Association was held at Boise, Idaho, November 22 and 23. Among the speakers were James F. McCarthy of the Hecla Mining Company, who discussed the Outlook for Lead, and Stanley A. Easton of the Bunker Hill & Sullivan Company, who discussed The Zinc Industry. H. F. Washburn of the Federal Mining & Smelting Company presented a paper on the Mining Industry and its Employes. A. P. Ramstedt of the Hercules Mining Company discussed the tax provisions of the Social Securities Act and Donald A. Callahan of the Callahan Lead-Zinc Company discussed Taxes Effecting the Idaho Mining Industry.

UNDER the terms of the Guffey Coal Act the National Bituminous Coal Board has ruled that those who sell to the government must purchase coal from those who meet the provisions of the Guffey Act. A series of questions respecting the scope of the order are answered in a letter written by the board on November 18 and addressed to the acting director of procurement. Copies may be had upon request to the commission.

A COMPLETE list of analysis of United States export products benefiting from the trade agreement with Canada and an analysis of Schedule 1 of the Canadian-American agreement have been issued by the Bueau of Foreign and Domestic Commerce, Department of Commerce. Additional treaties are pending with Brazil, Spain, Switzerland and the Netherlands.

AT A MEETING of the mining section of the Sacramento Chamber of Commerce on October 5, California's gold and silver mining interests actively protested the so-called "severance tax" project which is part of the money-raising plan of the legislature and the Merriam gubernatorial administration. It was pointed out that the proposed tax would prove a complete extinguisher for a large number of "marginal mines" opened since the prices of gold and silver mounted to their present levels; also, that it would work such a financial hardship on a majority of, if not all, major producing properties as to seriously jeopardize the industry as a whole in California.

THE total production of bituminous coal for the calendar year to November 16, was 316,732,000 tons. This is an increase of a little more than three million tons over the same period for 1934.

THE California Copper Corporation is undergoing a complete reorganization. Cyril Stevenson has been elected to the presidency. J. J. Dunlop has been appointed vice president, and S. H. Galbraith has been appointed secretary-treasurer.

CARNEGIE Institute of Technology has arranged with a group of well known metallurgists to present to the students of the college a series of addresses dealing with the metallurgy of metals. These lectures will be a regular weekly college course. Among the metals being considered are aluminum, vanadium, molybdenum, tungsten and all modern magnetic alloys and their uses.

GETTING NEXT TO THE NEW DEAL SWARM

—Washington Star

THE Illinois Coal Operators' Association are removing their offices from their West Jackson Boulevard address to their former location, the Bell Building, 307 North Michigan Ave., Chicago, Ill. W. J. Jenkins, president of the Consolidated Coal Company, is president of the Association.

HORNBLOWER and Weeks in a recent review assert the belief that the copper industry is now on a sound basis and with further business recovery will again enter a period of prosperity. They also estimate the life of our known copper deposits as sufficient for 40 years at the 1929 rate of world consumption when approximately two million tons was produced. In 1931 stocks of refined copper in the United States was approximately 625,000 tons, which has now been reduced to 226,700 tons, which is an estimated five months' supply at the rate of consumption of primary copper for the first 10 months of this year.

AWARDS made by the Navy Department in connection with its purchase of 910,000 pounds of electrolytic grade of copper in ingot form were recently announced. One hundred and fifty thousand pounds was placed with the Nassau Smelting & Refining Company, Ltd.; 360,000 pounds went to the Chase Brass & Copper Company; 200,000 to the American Metal Company, Ltd.; 200,000 pounds to the International Minerals & Metals Corporation.

THE Pittsburgh Coal Company has filed a bill in equity in the United States District Court at Pittsburgh seeking an injunction against the imposition and collection penalties and taxes provided for in the Guffey Coal Bill and a decree that the act be declared unconstitutional and void. This company was one of the original proponents of this legislation, but later reversed its position and with other large coal companies refused to sign the code under the Bituminous Coal Commission.

THE coal strike which has been in progress for several weeks in the Alabama coal mining fields came to an official close on Saturday, November 23. The strike had completely stopped operation at coal mines in Alabama for eight weeks. The coal miners were given a small raise in wages, but not what they demanded. Mines resumed work on November 26.

THE U. S. COURT OF CLAIMS, in a decision handed down November 4, ruled that the Government had no right to assess retroactively the 50 percent tax on profits in silver futures made before the Silver Purchase Act became effective on June 19, 1934. The decision favored the plaintiff, Percy K. Hudson, who sued to recover $4,311, representing the amount of taxes he paid under the 50 percent tax provision on silver purchased May 3, 1934, and sold May 23 to May 29. The sole issue in the case was the contention of the plaintiff that the tax was "invalid and unconstitutional" because it was retroactively imposed. The court stated that its ruling would affect only a very few cases so far as the Silver Act is concerned.

JONES & Laughlin Steel Company has reopened its Bobtown mine in Greene County, Pennsylvania, which has been idle for more than two years. More than 1,200 workers will be given employment.

THE Coal Mining Institute of America on November 23 held its annual dinner at the William Penn Hotel in Pittsburgh. Almost a thousand coal men attended and the meeting was marked by a departure from the usual practice of coal mining associations in that it was attended alike by operators and labor leaders. Philip Murray, vice president of the United Mine Workers of America, served as toastmaster. Among the speakers at the head table were Wm. Affelder, vice president of the Hillman Coal & Coke Company; J. D. A. Morrow, president of the Pittsburgh Coal Company; Philip Murray, United Mine Workers of America; John Ryan, Mine Safety Appliances Company; Thomas Moses, president of H. C. Frick Company; Pat Fagan, United Mine Workers of America; and John O'Leary of the Bituminous Coal Labor Board. This is said to be one of the finest dinners ever staged by the organization.

THE Kennecott Copper Corporation has acquired the American Electrical Works of Phillipsdale, R. I. Officials of Kennecott and its subsidiary companies have been elected as officers and members of the board, but there is no announced change in the operating and sales force. Through this affiliation Kennecott will enter the copper wire manufacturing field for the first time.

A SUPREME Court of Industry, privately financed has been advanced by F. I. Kent of the Bankers Trust Company as a manner in which the difficulties of business may be solved. He proposes that such a court would be an arbitrator for business men in their disputes with each other and go-between for them in their contacts with the government. Mr. Kent made his suggestion to the meeting of the National Foreign Trade Council and said "A National Industrial Board, a Supreme Court of Industry, a group of 25 men each of whom will represent some great zone of industry; men who have records of accompishment and patriotism, who will command the confidence and respect of those whom they represent and who will give up their business to devote their time under proper renumeration to the solution of the problems of industry," could do much to straighten out the present industrial muddle.

THE general revival of the iron ore industry is being felt throughout the United States. It is noticeable in the Lake Superior iron producing district and in the southern and eastern groups affiliated with the steel industry. Operators are looking forward to a 1936 production of between 35 and 40 million gross tons of ore. Steel men are said to be optimistic concerning the coming year.

EARLY in November, the Treasury Department issued TD 4598 from the office of the Commissioner of Internal Revenue. It in effect amends Article 31 of the "Regulations Relating to the Tax on the sale or other disposal of bituminous coal under Section 3 of the Bituminous Coal Conservation Act of 1935."

AMONG the coal operators appearing before the court in the Carter suit to determine the constitutionality of the Guffey Act were H. L. Findlay, of the Youghiogheny & Ohio Coal Company; George W. Reed, of the Peabody Coal Company; C. W. Watson, Elkhorn Coal Corp.; E. C. Maham, Southern Coal & Coke Company; W. P. Tams, Jr., Gulf Smokeless Coal Company; W. A. Richards, Majestic Coal Company.

THE Union Collieries Company of Pittsburgh on November 23 filed suit in the District Federal Court challenging the constitutionality of the Bituminous Coal Conservation Act of 1935.

THE National Bituminous Coal Commission held its first hearing on the 21st of November. The purpose of this discussion was to determine the feasibility of prescribing uniform methods of coal classification and using a maximum number of coal sizes for price area No. 1. Chairman Hosford made a plea for individual and corporate cooperation with the commission and urged industry to forget its selfish interest and lend its whole support to the plan contemplated by the Bituminous Coal Conservation Act. He, however, stated that if the industry would not cooperate that inas-

TOTAL SUPPLIES OF FUELS COMMONLY USED FOR DOMESTIC PURPOSES IN THE UNITED STATES, 1924-1934*

(Wherever available, the figures represent the quantity actually consumed for domestic heating or for heating offices, apartments, hotels, schools, hospitals, etc. Where such figures are not available but where the fuel is used chiefly for domestic purposes, total production (or imports) is shown to indicate the trend of growth. All figures represent latest revisions obtainable at time of publication.)

	1924	1925	1927	1929	1931	1933	1934
Solid fuels (net tons)							
Pennsylvania anthracite production:							
Shipments of domestic sizes	56,576,296	38,305,222	48,999,058	46,141,575	35,437,946	27,755,333	33,269,928
Shipments of buckwheat No. 1(1)	9,510,508	6,631,604	9,062,977	8,597,053	7,956,978	6,625,755	7,785,412
Shipments of smaller steam sizes	11,160,695	8,831,546	12,433,251	10,555,951	9,240,931	8,954,321	9,700,982
Local sales	3,043,939	2,884,577	3,046,770	3,233,023	2,901,117	3,249,552	3,285,936
Total commercial production	80,291,438	56,652,949	73,542,056	68,527,602	55,536,972	46,584,961	54,042,258
Anthracite exported	4,017,785	3,179,006	3,325,507	3,406,369	1,778,308	1,034,562	1,297,610
Anthracite imported, chiefly from United Kingdom and Russia	117,951	382,894	119,030	487,172	637,951	456,252	478,118
Fuel briquets produced	580,470	839,370	970,468	1,212,415	698,316	530,430	704,856
Fuel briquets imported	38	6,758	60,601	89,458	60,950	42,395	.....
Byproduct coke sold for domestic use	2,812,771	4,085,068	4,702,529	7,376,320	8,376,652	10,215,360	10,174,114
Beehive coke sold for domestic use	139,886	392,698	111,103	134,703	118,665	275,677	346,181
Coke imported	82,833	201,579	168,859	119,724	103,563	160,873	160,934
Gas-house coke sold	1,400,000(2)	1,369,000(3)	1,484,000(3)	980,000(3)	813,400(3)	498,000(3)	513,200(2)
Petroleum coke produced	761,100	991,000	1,145,200	1,820,600	2,032,000	1,580,000	1,300,000
Anthracite and semianthracite produced outside of Pennsylvania	704,513	786,594	651,869	842,313	507,140	350,068	380,055
Bituminous coal for domestic use	(4)	(4)	(4)	(4)	(4)	(4)	(4)
Oil (barrels)							
Domestic heating oils:							
Range oil(5)	(6)	(6)	(6)	(6)	4,549,000	10,269,000	15,756,000
Other light fuel oils(7)	5,021,000	8,829,000	11,709,000	19,581,000	24,848,000	50,140,000	60,822,000
Commercial heating oils(8)	(6)	12,100,000	15,751,000	17,820,000	15,731,000		
Liquefied petroleum gases, domestic	(6)	(6)	(6)	140,500	364,200	395,900	421,000
Gas (million cubic feet)							
Natural gas consumed for domestic use(8)	285,152	272,146	296,036	359,853	380,897	368,774	379,497
Manufactured gas sold for domestic and house-heating purposes	(6)	(6)	288,994(3)	298,751(3)	275,318(3)	226,557(3)	233,500(2)

* From Pennsylvania Anthracite Coal Tables. Published by U. S. Bureau of Mines.

(1) A considerable part of the buckwheat No. 1 is used for domestic purposes. (2) Partly estimated. (3) Based on figures from Census of Manufactures. (4) Between 56,000,000 and 77,000,000 tons a year. (5) Oil used for heating houses. (6) Data not available. (7) Includes furnace oil. (8) Used for heating offices, hotels, apartments, schools, hospitals, and buildings other than houses.

much as the commission was charged with certain responsibilities it will do its best to carry out the provisions of the act. The advisory committee recommended to the commission that there should be a maximum of eight sizes in market area No. 1. Indiana, Illinois and West Kentucky protested this suggestion. While the hearing lasted for a full day the subject was such a complicated one that not a great deal of progress was made, but in spite of the differences of opinion, there seemed to be an earnest effort to arrive at some equitable solution.

THE total production of anthracite for the week ending November 9, was 554,000 net tons.

ON NOVEMBER 12 the first meeting of the voluntary advisory committee to the National Bituminous Coal Commission was held. Problems discussed were "Determination of Pricing and Marketing Policies." They particularly discussed the establishment of minimum prices for the various producing districts as well as measures for the enforcement of the act. A subcommittee was appointed which will consider specific problems, among them simplification of price lists and standard methods of classification. John L. Lewis, president, United Mine Workers of America, represented labor, and the following operators constitute the advisory board: Charles A. O'Neill, H. L. Findlay, Ralph E. Jamison, D. T. Buckley, R. A. Courtney, C. J. Potter, T. J. Ashcraft, Ezra Van Horn, G. C. Eastwood, E. G. Mathiott, W. A. Richards, W. J. Magee, S. S. Lanier, Jr., R. N. Meuter, J. R. Henderson, Jonas Waffle, K. C. Carnoy, M. G. Youngquist, R. A. Young, R. W. Shumway, D. T. Harris, Jr., Albert Gately, D. R. Swem.

A MEETING was held on November 18 under the auspices of the National Labor Relations Board to consider a petition for the election to choose employe representatives for collective bargaining purposes, in the Portsmouth, Ohio, plant of the Wheeling Steel Corporation. The plant employs approximately 4,800 men and the workers petitioning are members of five lodges of the Amalgamated Association of Iron, Steel and Tin Workers.

THE National Foreign Trade Council, of which James A. Farrell is chairman, held its twenty-second National Foreign Trade Convention at Houston, Tex., November 18, 19, and 20. The Honorable Jesse H. Jones, chairman of the board, Reconstruction Finance Corporation, presided as toastmaster at the dinner on November 19. Representatives from all of the leading nations participated in the deliberations of the meeting.

THE copper industry is apparently making great strides toward a return to prosperity. World stocks of refined copper declined 35,101 tons during October. This is said to be one of the sharpest drops ever recorded and brought total copper supplies to the lowest level in several years. World shipments of copper for consumption during October set a new high since October, 1929, totaling 164,500 tons.

IN A RECENT article presented by Mining and Metallurgy, some interesting figures are given on the production of magnesium. They state that it is being produced in greater quantities today than antimony, bismuth, cadmium, gold or silver, and that its increase in production in the United States last year is phenomenal, the total being 2,125 tons. The pre-depression peak for the year 1929, was but 424 tons.

* * *

The following summary of the viewpoints of various agencies on the present upward trend of business are of interest.

Federal Reserve Board—"Nation experiencing most substantial economic advance since 1929."

Department of Commerce—"Industrial output first half of November moved forward on wide front."

Securities and Exchange Commission—"Stock and bond sales in October on nation's securities exchanges mounted 161 percent over October, 1934, and 32 percent over September."

Federal Housing Administration—"Growing trend toward recovery in building trades evidenced throughout the country."

Department of Labor—"Continued substantial gains in employment. 260,000 returned to jobs in private industry in October. Weekly pay roll increase $8,200,000."

American Federation of Labor—"Nation now at threshold of industrial boom."

Association of Railroads—"Carloadings week ending November 16 were 7.4 percent more than corresponding week of 1934."

Weekly Iron and Steel Review—"Consumption of steel is highest since June, 1930."

National Association of Manufacturers—"Administration's policies are retarding recovery."

* * *

THE General Counsel's office, Internal Revenue Bureau, has in preparation regulations to govern collections of the 1 percent payroll tax, effective January 1, 1935, under the Social Security Act. These regulations may be obtained as soon as available at the District Collector's office.

THE Mining Committee of the Chamber of Commerce of Denver, Colo., has mailed invitations to 125 mining men and to 12 mining camp newspapers to attend a dinner at the El Paso Club, Colorado Springs, Colo., on December 7. Former Governor Jesse McDonald, who is now Governor of the Western Division of the American Mining Congress, and Robert S. Palmer, secretary of the Colorado Chapter of the American Mining Congress, will attend the dinner and make a report on the annual meeting of the organization held in Chicago last September. At this meeting plans will be discussed for the annual sow belly dinner of the Colorado Mining Association to be held January 24 and 25.

SECRETARY ICKES announces that 46 states are now officially organized under the National Resource Committee's Planning Boards. He finds that these boards are now sufficiently well organized to render a needed aid to the administration's improvement program. One hundred and thirty-seven thousand projects have been under consideration, the total cost to consummate which would be above 20 billion dollars. Twenty-one thousand administrative proposals have been reported to the state planning boards as well. The state planning boards are purely advisory bodies concerned with harmonizing policies and working out unified programs. Mr. Ickes said, "In the Natural Resource Committee, which is an integral part of the administration, we have a body that is gradually evolving a national plan which I am sure will fit into an adequate social vision of the future."

THE Anthracite Institute on November 12, took a group of 32 newspaper men to Pottsville, Pa., where they were taken through a mine and breaker. They also inspected the places where coal stealing in the anthracite field is most prevalent. The men who made this trip were widely experienced newspaper men and were of the opinion that the country at large had no conception of the extent or the seriousness of the stolen coal situation.

J. M. SYMES, vice president of the the American Association of American Railroads, in a letter addressed to member roads regarding the purchase of fuel coal said, "At a meeting of the special purchasing committee, today, they have recommended that until the Guffey law is made effective, railroads which do not have written contracts should purchase their coal supply, including recent wage increases, at not to exceed the last effective NRA railroad code prices. In the case of railroads having written contracts, the committee feels that such railroads should negotiate with operators to secure prices which do not exceed NRA code list."

MICHIGAN has an interesting safety record according to reports from the U. S. Bureau of Mines, from companies operating mines, chiefly iron and copper, within the state. They report a gain of more than 4 percent in the average number of men employed, and a decrease of more than 25 percent in the injury rate from accidents to employes. Fifty-seven mines were operating in 1934 employing 6,551 men, who worked approximately 8 hours a day for 209 days during the year.

THE Lake Superior Iron Ore Association recently announced that shipments of ore from the upper lake ports during October totaled 4,600,661 tons, or approximately double the tonnage shipped in the same period last year. Total shipments to November first for the 1935 season amounted to 26,804,874 tons.

SENATOR GUFFEY, Democrat, Pennsylvania, in discussing his Coal Control Law, recently predicted that if the Supreme Court upheld the law, that the same type of legislation will be developed for and applied to a number of other industries, particularly natural resources.

THE United States Bureau of Mines is organizing a comprehensive census of mines and quarries. It contemplates the taking of a real census which will be merged with the annual statistical reviews submitted by the bureau.

THE Reconstruction Finance Corporation has discarded the old 21-page form and has substituted a new form to be used by applicants for general mining loans. In announcing the change, they stated that the original form was so voluminous that it completely discouraged the making of applications. Circular No. 14, which gives information concerning mining loans has been revised and simplified. A brief summary of the circular has been prepared and will be sent to any interested party.

THE Coeur d'Alene District of Idaho is now employing better than 3,000 miners. The Bunker Hill & Sullivan Company employs approximately half of this number and the Federal Mining and Smelting Company, the Hecla Company and others making up the remaining number.

A FELLOWSHIP which will allow two years of graduate study in the Metals Research Laboratory of the Carnegie Institute of Technology has been established by the Molybdenum Corporation of America. Holder of the two-year grant will be Coolidge Alexander Karns, a graduate of Gettysburg College and former metallurgist with the Republic Steel Corporation, Buffalo. Karns will study the application of tungsten in alloys. This is the second such fellowship grant to be established. Last year the Aluminum Company of America made a similar award. Further collaboration with industries on graduate study grants is planned by the Carnegie metals research group.

NUMEROUS suits have been filed against the Coal Conservation Act. Among those, in addition to the Carter Coal case, who are testing the validity of this act are the following: The Alabama Fuel & Iron Company; this suit is substantially predicated upon the same premise as the Carter and the Tway cases. The Island Creek Coal Company, the Mallory Coal Company, the Pond Creek Pocahontas Company (subsidiary of Island Creek), and Cabin Creek Consolidated Coal Company. This scatters the locale of the test suits widely, with Alabama, Pennsylvania, Kentucky and West Virginia represented. It is anticipated that a considerable number of additional suits will be instigated shortly.

THE trade treaty recently negotiated with Canada makes no changes in the existing trade and tariff regulations between the two countries respecting coal. The National Coal Association has presented a brief urging that in the negotiations for the treaty a lower tariff on American coal to Canada should be allowed. They also asked for the reimposition of the countervailing duty on Canadian coal, which has been imposed by our tariff laws of 1930, but which was rescinded in 1934. The Association's brief pointed out that Canada imposed an import duty of 75c a ton on American bituminous. Canada is a very large purchaser of coal, some 13 million tons being imported in 1929 which was reduced to approximately seven and a half million tons by 1933.

AT the annual meeting of the Indiana Coal Operators' Association, C. M. Templeton was elected president. Harvey Cartwright was reelected secretary-treasurer. B. H. Schull was elected vice president and the board of directors is as follows: David Ingle, Sr.; Wm. R. Bootz, P. L. Donie, Wm. Zellar and H. M. Ferguson.

IN THE Canadian trade pact the concessions made by the United States to Canadian minerals and their products are not considered important as compared with the balance of the treaty. In all about 17 mineral items are affected by the reductions granted. Those on which duties were reduced included cobalt oxide, from 20c to 10c per lb.; fire brick from 25 percent ad valorem to 15 percent; limestone not suitable for building stone, from 5c to 2½c per 100 lbs.; lime, from 10c to 7c per 100 lbs.; hydrate lime, from 12c to 8c per 100 lbs.; crude feldspar, from 50c to 35c per long ton; talc, stearite or soapstone, from 35 percent to 25 percent ad valorem; dead-burned lime-magnesia refractory material, from 30 percent to 27½ percent ad valorem; ferro-manganese containing not less than 4 percent of carbon, from 1⅞c to 1⅝c per lb. on the manganese content; ferrosilicon containing not less than 8 percent and not more than 30 percent silicon, from 2c to 1½c per lb. on the silicon content; ferrotitanium, ferrovanadium, and ferrouranium, from 25 percent to 15 percent ad valorem. In addition, articles now on the United States free list which are bound to it for the life of the treaty include unmanufactured asbestos, cobalt and cobalt ore, crude artificial abrasives, nickel ore, nickel matte, and nickel oxide, and crude plaster rock and gypsum; also sulphuric acid, calcium cyanamid or lime nitrogen, and sodium cyanide.

Mineral products exported from the United States which are affected by the treaty include zinc dust and strips and sheets which are bound on the free list as formerly; rails; wire of all metals and kinds, reduced from 35 percent to 30 per cent: Significant reductions were made by Canada on machinery of many kinds, especially metal and coal mining machinery, as well as in manufactured machinery containing iron and steel and in electrical machinery.

THE MINERALS YEARBOOK, 1935, says that the total output of nonferrous ore in 1934 was 35,840,737 tons, an increase of 45 percent from 24,712,694 tons in 1933; the production in 1932 was 26,321,679 tons and in 1931 it was 54,764,842 tons. There were substantial increases in the output of copper ore, gold and silver ore, zinc ore, and lead-zinc ore. Of the total ore produced, 27,167,530 tons, or 75.80 percent, were treated by concentration, 1,754,010 tons, or 4.89 percent, were shipped direct to smelters, 5,724,192 tons, or 15.97 percent, were treated at gold and silver mills, and the remainder (1,195,005 tons, or 3.34 percent) was treated at miscellaneous plants including copper leaching plants, magnetic concentration plants, and a slag fuming plant. More than 96 percent of the total ore concentrated was treated at plants using flotation equipment in whole or part.

There was a marked increase in the total consumption of flotation reagents in 1934 due to the increase in the number of plants operating and the tons of ore treated, but there were no significant changes in the per-ton consumption of the more important reagents.

LOUIS C. MADEIRA, III, executive secretary of the Anthracite Institute, in an interview on November 18 with the President of the United States, Franklin D. Roosevelt, urged that the duty on Russian anthracite be increased from $2 to $5 a ton. He pointed out that Russian imports had increased 196 percent since 1929. It is understood that Mr. Madeira also discussed with the President the alarming situation created through the bootlegging of "stolen" anthracite which has reached such proportions.

HAZARD Coal Operators Association headquarters have been moved from Lexington to Hazard, Ky.

MINING operation in the Coeur d'Alenes is gradually beginning to assume proportions similar to the pre-depression era. Approximately 3,000 miners are now employed on a five-day weekly basis in this district, the largest employer of labor being the Bunker Hill & Sullivan Mining & Concentrating Company with approximately 1,200 men. Numerous small properties are now operating with from three to 10 men each, more of the latter type now being under development than for many years past.

A FUND of $857,000 has been made available from the Work Relief Program by the President to cover a nation-wide survey of the enterprises engaged in metal or non-metallic mining or quarrying. This survey will be undertaken shortly, and it is expected that there will be prepared for each state a central reference file of essential information on all metal and non-metallic mines, pits, quarries, and treatment plants. The file will include (a) records of past production and present capacity to produce; (b) number of men employed and man-shifts worked; (c) production methods, and such other information as may be desired by the mineral industries, and (d) references to published reports on the properties. The purpose of the project is to provide reliable information for all consumers and producers, engineers and investors, and Federal and state administrators. The work will be done under the direction of the Economics Branch of the Bureau of Mines.

THE United States Zinc Smelting Company at Moundsville, W. Va., has announced that it has increased wages of all employes 25 cents a day, beginning November 16. H. W. Lohman is president of the company, and states that he is increasing wages to meet the increased cost of living.

THE National Bituminous Coal Commission recently announced appointments to its Industry Advisory Committee. They are as follows:

District 1, Charles O'Neill, New York City; L. G. Ball, Philadelphia, Pa.

District 2, Ralph E. Jamison, Greensburg, Pa.; H. L. Findlay, Cleveland, Ohio.

District 3, R. A. Courtney, Fairmont, W. Va.; D. T. Buckley, Boston, Mass.

District 4, Ezra Van Horn, Cleveland, Ohio; Wm. Emery, Jr., Cleveland, Ohio.

District 5, Geo. C. Eastwood, Saginaw, Mich.

District 6, E. G. Mathiott, Cleveland, Ohio; R. L. Berry, Wheeling, W. Va.

District 7, W. A. Richards, Bluefield, W. Va.; O. M. Deyerle, Bluefield, W. Va.

District 10, J. R. Henderson, Chicago, Ill.; E. F. Stevens, St. Louis, Mo.

District 11, Jonas Waffle, Terre Haute, Ind.; B. E. Lundblad, Indianapolis, Ind.

District 12, M. G. Youngquist, Des Moines, Iowa; K. G. Carney, Des Moines, Iowa.

District 13, H. S. Salmon, Birmingham, Ala.; David Roberts, Jr., Birmingham, Ala.

District 14, R. A. Young, Fort Smith, Ark.; J. F. Lake, Fort Smith, Ark.

District 15, Frank Eviston, Kansas City, Mo.

District 16, R. W. Shumway, West Virginia; J. P. Peabody, Denver, Colo.

District 18, V. R. McKnight, Albuquerque, N. Mex.; Dan P. Harris, Albuquerque, N. Mex.

District 19, T. J. O'Brien, Salt Lake City, Utah; L. T. Dee, Ogden, Utah.

District 22, Albert Gately, Chicago, Ill.

District 23, D. R. Swem, Seattle, Wash.; Geo. Watkins Evans, Wilkeson, Wash.

ON NOVEMBER 18 the National Bituminous Coal Commission announced that 231,071,000 tons of production during 1934 have signed up with the Code. This represents approximately 60 percent of the total 1934 production.

PENNSYLVANIA Anthracite Coal Tables 1934 just released by the United States Bureau of Mines give final statistics of production of Pennsylvania anthracite. The data included in this release is most comprehensive and covers statistical trend, production, shipments and value of the coal, average sales realization, number of men employed, days worked, etc.

SHIPMENTS of anthracite for the month of October, 1935, as reported to the Anthracite Institute, amounted to 3,681,252 net tons. This is an increase, as compared with shipments during the preceding month of September, of 93,871 net tons, or 2.62 percent, and when compared with October 1934, shows a decrease of 345,458 net tons, or 8.58 percent.

Obituary

Michael J. Dailey, general manager of the Silver King Coalition Mines Company of Park City, Utah, since 1918, died at his home in Salt Lake City, Nov. 12, 1935.

Mr. Dailey was a veteran among Utah metal mine operators. He was born in Pennsylvania, Jan. 27, 1867, and moved to Nebraska with his family when a young boy. He came to Utah in 1891 where he entered the mining business with which he was associated almost continuously until his death. Mr. Dailey's first employment with the Silver King property was as a miner and he became successively timekeeper, mine foreman, mine superintendent, assistant manager, and general manager.

He was highly esteemed by those who knew him, not only for his attainments as a mining operator, but for his high character, modesty, and generosity.

Mr. Dailey had been a director and vice governor of the Utah Chapter, American Mining Congress, since March 10, 1930.

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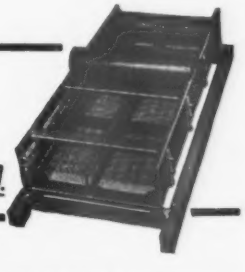

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Development of Safety In Michigan Iron Mines

(*Continued from page* 31)

be absolutely essential as long as the possibility exists that an accident may occur from a certain danger and there also exists the probability that it will be eliminated by the installation of a simple device. As experience showed that the causes of many accidents were traceable to unsafe ways of doing work, negligence and indifference, standardization of mine equipment and mine operations became imperative. In the formulation of standards, the active cooperation of the foremen and bosses was of incalculable value, and it has resulted in the desired effect of reducing accidents. Incidentally, it is worthy of note to mention that the economic dislocation in the iron industry of recent years has caused no relaxation in the maintenance of rescue apparatus and the rigid enforcement of standards for the prevention and fighting of underground fires. Contrary to expectation, the standard prohibiting smoking in mines caused little dissatisfaction among workmen and its enforcement has brought less violation than has characterized other standards.

Nearly all the iron ore mined in Michigan is obtained underground, and top-slicing and sub-level caving are the principal methods of extraction. These mining methods are particularly favorable for guarding against accidents by falls from roof or back. As there is an abundance of forests in close proximity to the mines, timber is always available for securing working places. Much care is taken in culling that which is defective and undersize. In many mines steel is used in the advancing headings to reinforce overhead timber. Better illumination has aided in reducing underground hazards. There are five mines on the western end of the Marquette range in which safety electric lamps are used.

Our days of shallow mining, excepting by open pits, apparently have passed. The transportation of men into and out of deep mines involves considerations which must be dealt with properly by experienced mechanical engineers. That shaft accidents at our mines have been comparatively few bears testimony to the constant concern that management has paid to this occupational hazard. Hoisting cables, over-winding and slack rope devices, shaft runners and cage fixtures are systematically inspected by competent foremen, whose reports reach the higher officials. To ride in a cage, with the door open, is a serious violation against safety in most mines, and the cager detected in committing such an offense knows well that a lay-off awaits him at the end of the shift. When inspecting or repairing shaft compartments, security from falls is found by wearing belts.

We have long appreciated that the relativity of accident frequency from electrical hazards is about as dependent upon the installation of the equipment as it is upon the operating functions. So-called "hay-wire" work is no longer tolerated in our mines; it has gone to the condemnation pile. A deep mine cannot be operated efficiently these days in our district without modern electrical appliances and the service of competent electricians. Our standards, both in respect to equipment and operation, are in conformity to approved electrical codes.

The hazards incidental to the use of explosives are common to mining everywhere. We found that well-defined standards for the handling and exploding of detonators and dynamite are guides pointing the way to freedom from many of the accidents which characterized this work in the past. Of course, like all standards, their effectiveness depends upon leaving no leeway for deviation from safe practices.

The physical examination of workers, as an index by which they may be placed in positions where they do the work they are physically capable of doing, has not been avoided. The need of supplying a source of fresh air in all working places underground, both as regards health and labor economy, was pointed out to us as early as 1912 by the United States Bureau of Mines engineers. Ventilation, by mechanical control, was started at that time and is now being carried on very vigorously in all deep mines. During the past two years the iron industry of our district has had the service of a very capable expert to direct our effort to correct the unwholesomeness that may exist in the mine air due to dust contamination. The investigation and the corrective measures are being pushed vigorously throughout the entire field.

Our foremen and bosses, representing management and interpreting its safety policy, fully appreciate their responsibilities as they make frequent visits daily to the working places. Educational processes and monetary awards are not the only forces that urge them forward in the direction of safety, for the security of their positions is at stake if they fail to measure up to the high standards of administration which are now demanded of them.

I now turn to that phase of my subject which at times is most vexatious and arduous, namely, the art of controlling the actions of men as they pursue their various jobs with the association of occupational hazards. Men's talents and ability are often sorely taxed in the search for perfect regulated individualism and perfect teamwork, without which accidents are inevitable. To merely enumerate the great number of means that have been utilized with these objects in view would require much time. All the influences that are found in advertising propaganda, awards and bonuses, discipline, and other measures, have been brought to bear upon our men in order to produce safe workers.

I think that is the secret for the success that has come to those mines credited with unusually good accident records.

Difficult Heading Driving and Pumping Problems

(*Continued from page* 38)

Since, the heavy roof from which this water came has been taken down. At the thickest it was 10 feet thick and broken up by numerous cracks. There is still considerable flow of water from this strata along the down stream rib in No. 4 heading. The strata was about six feet thick in No. 2 heading and at present only a small flow of water carries through it in this entry. No water is coming from the strata overhead.

On the far side of the river the roof was excellent and only a slight seepage from the coal was encountered. I might mention again that very little cement grout was forced in holes drilled on that side of the river.

You will notice on the profile that at the point where it was necessary to grade the greatest flow of water came from the bottom. We were able to successfully grout off this water by use of concrete mats and then grout through and under them. The June issue of *Coal Age* described the methods we used.

We have attempted to grout off the heavy flow encountered in the bottom in No. 2 heading. To date this flow has been reduced and we are now preparing to pour additional mats over the weak bottom and make an effort to completely seal off the flow. Traces of cement were found when loose bottom was being taken up while preparing to pour the mat in No. 2 but at no time while the grout was under pressure in No. 4 was there a sign of grout flowing out. The pressure but not the volume of water seemed to increase in No. 2 as No. 4 was sealed off.

At the present time the water made in both No. 2 and No. 4 headings on the down grade is carried by ditches to a natural sump on the far side of the river. A 225 G. P. M. LaBour pump, powered by a 440 volt motor, pumps this water through a four-inch line to the pump station on the near side of the river. It is on air about one-third of the time. A 500 G. P. M. Allis-Chalmers single stage, double suction centrifugal pump handles the water from the sump to the surface through the bore hole.

Hauling coal through No. 2 while grouting, taking down bad roof and laying 60-pound steel enabled us to double shift development on the far side of the river. The main entry is now 1,700 feet beyond the river.

We are more than satisfied that the way to whip such a condition is by double and even triple shifting. Plenty of supervision, good rubber raincoats, hats and hip boots, each shift having their own, made for progress.

The Pond Creek Pocahontas Company believes that the 6,000 bags of cement pumped from the outside and the 1,000 or more used inside were not wasted and should we have a similar condition the same method would be used.

WITH THE MANUFACTURERS

THE INGERSOLL-RAND method of air lift pumping of water, oil, or other fluids is described in a recently issued 24-page bulletin No. 9042. A copy of Bulletin No. 9042 can be obtained from the company, 11 Broadway, New York, or any branch office.

THIRTY-TWO cubic yards (level full) at one bite is the record of the world's largest power shovel dipper, recently developed by The Marion Steam Shovel Company, pioneer excavator builders, Marion, Ohio, and placed in coal stripping service by The Northern Illinois Coal Corporation, near Wilmington, Ill.

FOUR new conduit grounding items, one box for fixture mounting and three grounding fittings which can be quickly installed and afford secure connections, have been announced by the General Electric Company's Merchandise Department, Bridgeport, Conn.

The fixture box, designated as Type SP-5200B, provides a simple and effective method of grounding, and makes possible firm mechanical and electrical connection between the box and the armor.

ALLIS-CHALMERS has for distribution an attractive new Bulletin No. 1477 on their Air Quenching Cooler. This cooler is the outcome of years of practical experience and investigation. It reduces to successful commercial operation the fundamental discovery that portland cement clinker taken directly from the discharge end of a kiln and air quenched has considerably lower grinding resistance and higher early strength than the same kind of clinker when slowly cooled or water cooled. This cooler, by heating the combustion air, not only reclaims the sensible heat of the clinker, but also further adds to kiln efficiency by reducing the amount of fuel required and thereby reducing the heat carried out the upper end of the kiln by combustion gases. This equipment has application also to the cooling of many materials, such as lime, that are processed in rotary kilns. In many instances, it is said, it can also be used for drying certain materials providing these come within proper size range and are neither fluid nor plastic. The bulletin, in addition to descriptive matter, contains shop photographs and numerous installation drawings and pictures.

A NEW illustrated folder entitled "Not All Coal Men Are the Same," which discusses the care experienced in the selection of jute for, and the manufacture of, Du Pont brattice cloth, a product used in mines, has just been prepared by the Fabrikoid Division of E. I. du Pont de Nemours & Co., and is ready for distribution. The folder carries a sample of the finished product.

GENERAL ELECTRIC'S unemployment compensation plan into which employes and company have contributed more than $7,000,000 in the past five and one-half years to care for its workers during the years of the depression, will terminate on December 31, at which time the Federal Social Security Act becomes effective, President Gerard Swope announced.

"In compliance with the Social Security Act of the Federal government, the General Electric Company must pay a tax on its entire payroll, beginning with 1 percent on January 1 and increasing to 3 percent in 1938," Mr. Swope explained. "The Federal law puts no tax on the employes, but it is permissive for the states to do so. In some states laws have already been passed calling for contributions by employes. It seems clear, therefore, that the General Electric plan must be terminated, as neither the company nor the employes will desire to pay under the federal and state plan and also under the company plan." There is approximately $3,000,000 on hand, $1,750,000 of which is in the local works funds and $1,250,000 in the general fund.

THE Link-Belt Company, Chicago, has recently removed its offices to the Bell Building, 307 North Michigan Avenue, where they will occupy the entire twenty-third floor and a portion of the twenty-first floor. This office was previously located at 910 South Michigan Avenue.

THE American Car Foundry Company, it is reported, is negotiating for the acquisition of Mount Vernon Car and Manufacturing Company, Ryan Car Company and the Bettendorf Company. It is estimated that more than 15 million dollars are involved in the transaction. Both A. C. & F. and Mt. Vernon sell mine cars to the mining industry.

HOW SKF bearings can replace plain bearings on fans and blowers is explained in a new bulletin, "SKF Bearings and Housings for Fans and Blowers," issued by SKF Industries, Inc., Philadelphia, Pa.

Types of fans, shaft diameters and other designations for 86 actual change-over jobs are given, and on the fourth cover is a convenient form for information to simplify changing over to SKF adapter mountings, cup sleeve mountings, knee type boxes, fan boxes, and knee type blower boxes.

A NEW 32-page catalog No. 1519 has been completed by Link-Belt Co., Philadelphia, on its line of single, double and triple reduction Herringbone-Gear Speed Reducers for large speed ratios, and heavy and shock loads.

THE improved McCaslin Pivoted Bucket Conveyor, recently perfected by the Mead-Morrison Division of the Robins Conveying Belt Company, is described in the company's new Bulletin No. 96.

THE Electric Controller and Manufacturing Company announce their new Line-Arc contactors, and will be pleased to furnish full information, without obligation, upon request to their Cleveland office.

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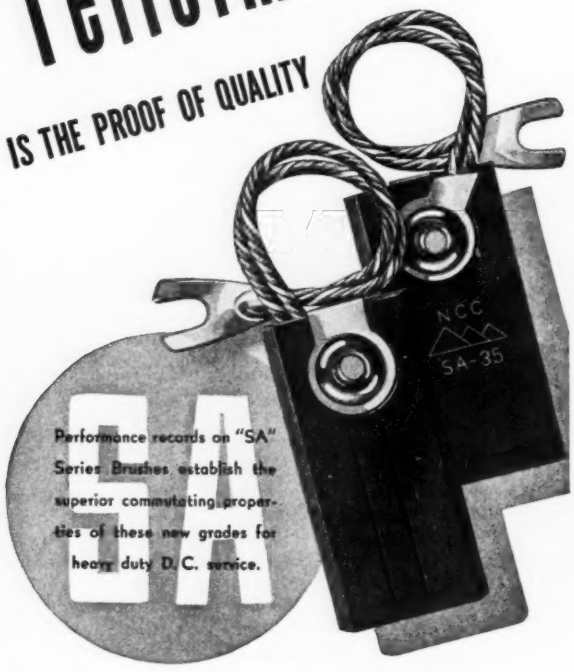
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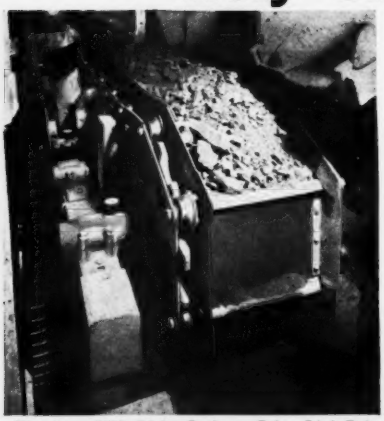
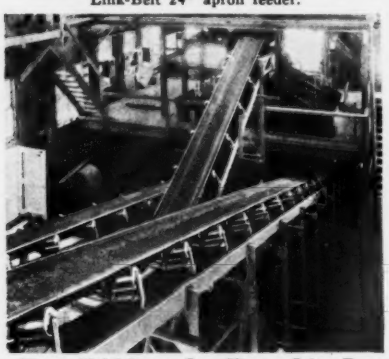
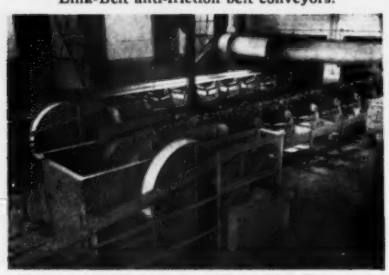


The Argo Mill, Idaho Springs, Colo. Link-Belt apron conveyor which handles ore from mill bin to primary jaw crusher.

Shenandoah Dives Mining Co., Silverton, Colo. Link-Belt 24″ apron feeder.



Climax Molybdenum Co., Climax, Colo. Four Link-Belt anti-friction belt conveyors.



Homestake Mining Co. Two Link-Belt anti-friction belt conveyors handling gold ore from cone crushers to storage bins.

Shenandoah Dives Mining Co., Silverton, Colo. 225-ft. long Link-Belt anti-friction belt conveyor.

Chain-O-Mines, Central City, Colo. 190-ft. long Link-Belt anti-friction belt conveyor.

Humphreys Gold Corp., Denver, Colo. Link-Belt portable screening and scrubbing placer gold recovery unit. Excavating is done by two Link-Belt draglines and one Link-Belt shovel.

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